VOLUME XLVIII NUMBER TWO

THE NATIONAL GEOGRAPHIC MAGAZINE

AUGUST, 1925

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ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, sprouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings and whose customs, ceremonies, and name have been engulfed in an oblivion.

THE Society also is maintaining expeditions in the unknown area adjacent to the San Juan River in southeastern Utah, and in Yunnan, Kweichow, and Kansu, China—all regions virgin to scientific study.

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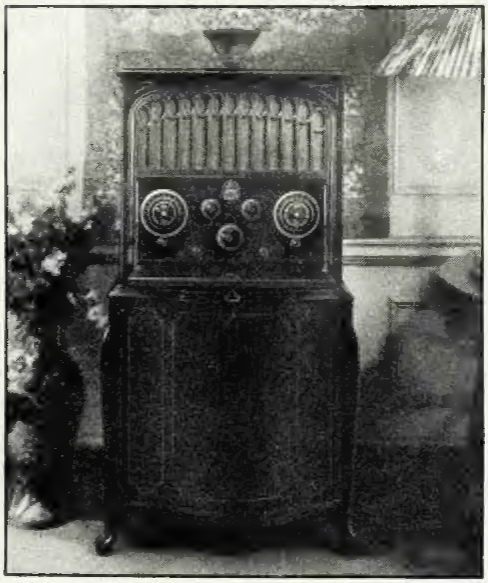

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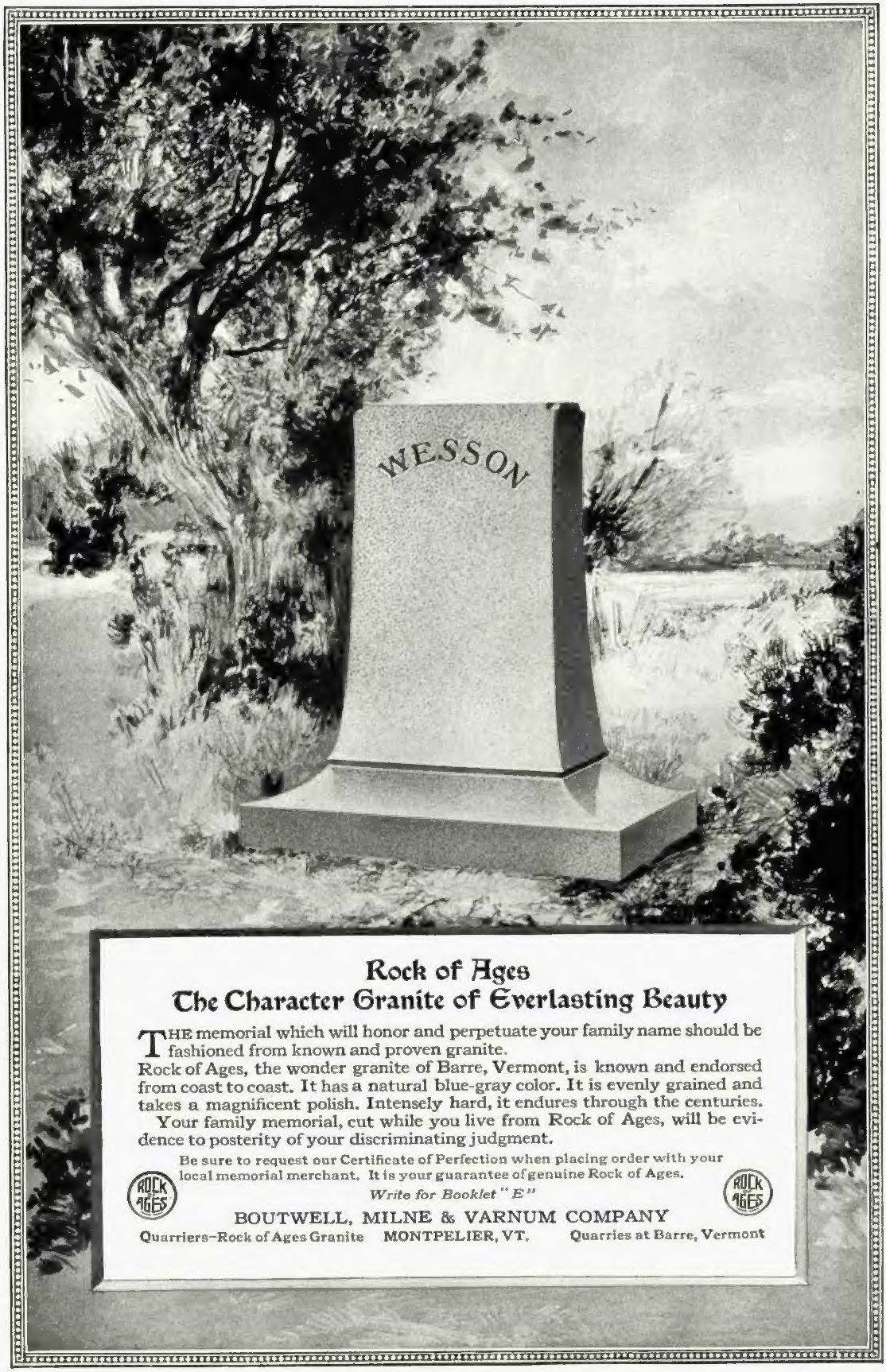

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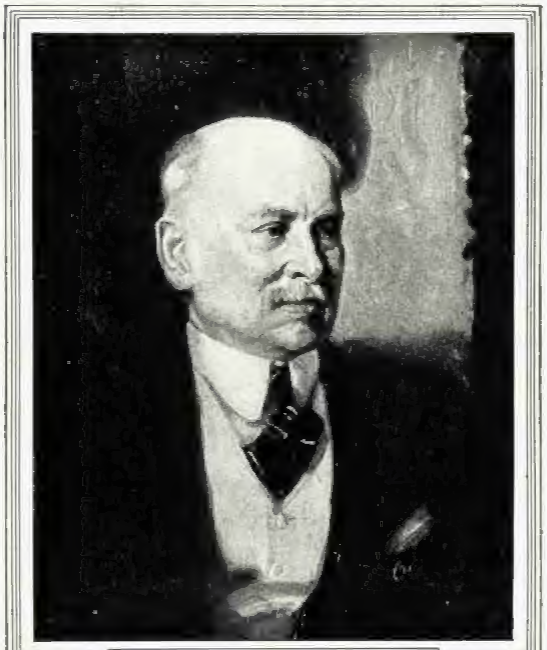

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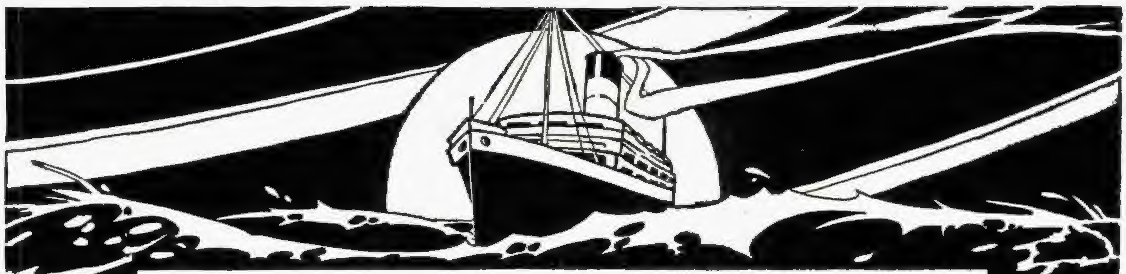

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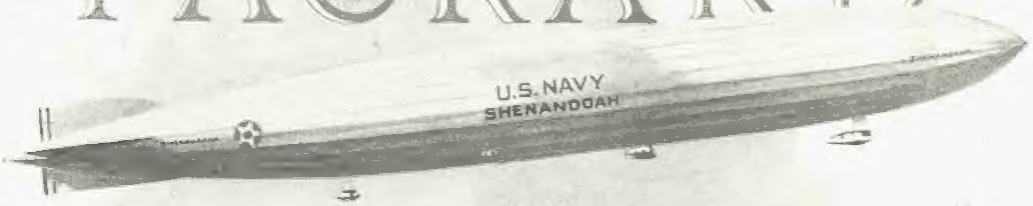

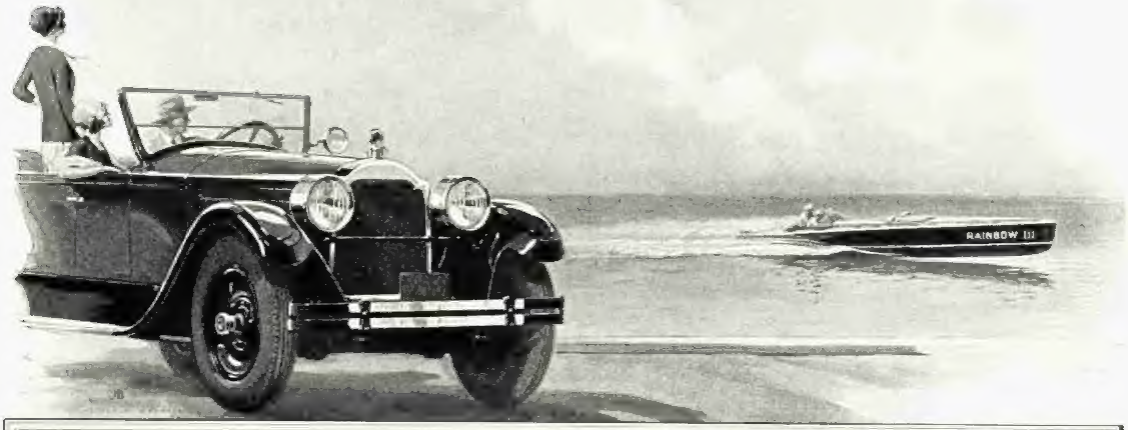

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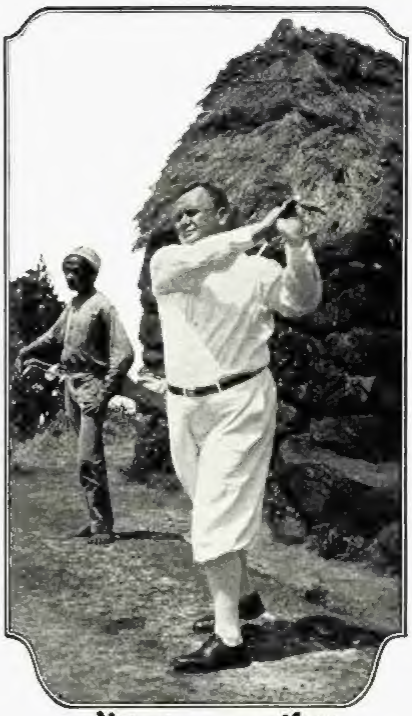

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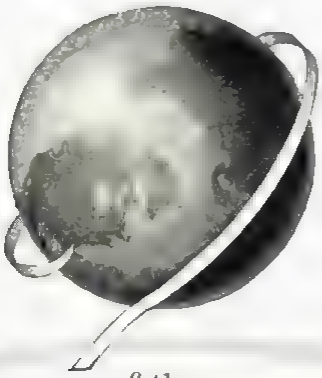

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The Magic of Print

THE old patent-medicine fakir knew well the magic of print. And the army of quacks who followed him have made use of the same magic. Most men and women accept without question *printed* statements which they might discredit were the same words *spoken*.

You will find quacks trailing along in the wake of every announcement of important medical research, with false claims of their "discoveries", their fake mechanical appliances and special treatments, their "health institutes" and their offers of free diagnosis and treatment by mail.

"Read the Label"

"DON'T take my word for it that this medicine will cure you! Don't take anybody's word! Read the label and see for yourself," the street corner patent-medicine fakir urged as he held up a bottle containing some colored liquid guaranteed to cure a long list of ailments and diseases. His confederate in the crowd asked to see a bottle —and then the sales began.

Millions for Fake "Cures"

Fake-medicine labels are more cautious than they used to be. The U. S. Government, through the Federal Food and Drugs Act, forbids false or misleading statements on the trade package. But this Act does not prohibit lying statements in advertisements, circulars, or window displays.

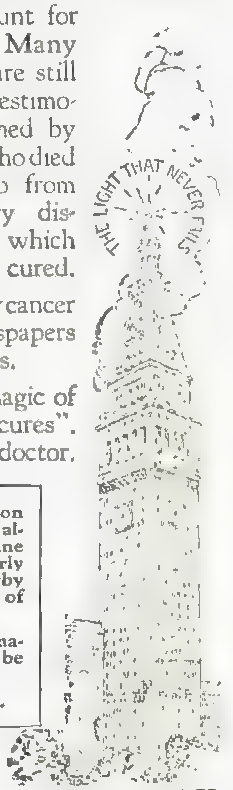
The vultures who prey on the sick advertise various remedies each guaranteed to cure a specific disease—tuberculosis, cancer, diabetes, kidney trouble, blood diseases, skin eruptions, epilepsy and almost every other serious ailment. Sick folk are pitifully easy victims. They experiment and hope—tragically—until it is too late. Waiting even a few weeks to try out a new patent medicine or a course of treatments at some dubious "health institute", may mean death which might have been prevented by the right medical care.

Cancer and Consumption "Cures"

Of late there has been a renewed wave of advertising of specific cancer and tuberculosis "cures". No medicine has ever been found that can be depended upon to cure these diseases—despite seemingly substantiated claims of manufacturers. Testimonials count for little. Many quacks are still using testimonials signed by people who died years ago from the very diseases of which they claimed they had been cured.

When a cure for tuberculosis or cancer *is* found magazines and newspapers will shout the glorious news.

Do not be deceived by the magic of print. Avoid advertised "cures". If you are sick see your doctor.



Although no specific remedy for the cure of tuberculosis has been found at the time this is written and scientists are working constantly on the problem there are literally hundreds of nostrums offered to the public as guaranteed cures.

Against this cruel exploitation of the sick, the Metropolitan Life Insurance Company invites the cooperation of editors and publishers everywhere.

It is true that the tuberculosis death rate has been reduced about 50% during the past 10 years and each year shows an improvement. This great battle is being won by a campaign of education through which people are being taught that although tuberculosis cannot be cured by medicine it can be prevented and even checked in its early stages and perhaps be permanently arrested—by fresh air, sunshine, rest and the right kind of nourishing food.

Booklets giving recent and authoritative information concerning Tuberculosis and Cancer will be mailed free upon request.

HALEY FISKE, *President.*

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Send a Pleasure Island package to a boy or girl (of any age) and give them a treat of charm and romance—as well as truly remarkable chocolates. Get Whitman packages at the nearby store that is sales-agent for Whitman's.

VOL. XLVIII, No. 2 WASHINGTON AUGUST, 1925

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WAIMANGU AND THE HOT-SPRING COUNTRY OF NEW ZEALAND

The World's Greatest Geyser Is One of Many Natural Wonders in a Land of Inferno and Vernal Paradise

By Joseph C. Grew

Undersecretary of State, U. S. State Department, Author of "Sport and Travel in the Far East"

Members of the American Fleet, now enjoying the sights of Australia and New Zealand, will upon their return to the United States in September have wonderful stories to tell of the antipodes. They are especially fortunate in that Waimangu (Black Water), the world's greatest geyser, for many years quiescent, has resumed activity, but not on the magnificent scale observed by the author.—The Editor.

IN THE North Island of New Zealand, if you drive from Rotorua straight back through the scarred and roughened lava-strewn hills toward Mount Tarawera, that old volcano of such grim associations, you will come upon what appears to be a peaceful pond lying motionless in a depression among the hills.

Among its dreary and barren surroundings not a living thing is to be seen; the thin steam that rises gently from its surface and from the other pools near by is the only sign of movement that breaks its stillness.

From the plateau in which it is sunk rise, in two directions, great rugged cliffs; and these form, as it were, a natural stadium in whose arena below is enacted at intervals one of the most marvelous and sensational spectacles which the natural phenomena of the world produce. For this is Waimangu, the largest geyser in the world, but a geyser whose action resembles far more the eruption of a great volcano than it does that of the slender jets of steam and water with which one usually associates the name.

When, in 1886, the appalling eruption of Mount Tarawera altered the face of the whole country, leaving in its path widespread loss of human life, destruction of villages and of millions of acres of cultivated fields, New Zealanders did not realize what a mighty landmark had been given them as compensation. They could only bemoan the loss of their famous Pink Terraces, which Tarawera had so ruthlessly torn from them, and they could not foresee the monument which was then set in course of construction to commemorate that terrible June night.

For Waimangu, though it was undoubtedly formed by that great upheaval, did not at once make known its birth. For 14 years it lay quiescent, slowly gathering power for the day on which it

Courtesy New Zealand Government

THE LOST WHITE TERRACES OF LAKE ROTOMAHANA

Under the 5,600 acres of this lake's waters lie the famous Pink and White Terraces, the most beautiful objects in the thermal regions before the destructive eruption of Mount Tarawera (see text, page 109). They were formed as basins by the sediment of the mineral waters from a geyser above the lake, and the floors were filled with clear, blue, boiling water. The tiny cascades playing over the terrace walls were transmuted by the sun's rays into sparkling, colorful showers of jewels. No similar terraces have formed since the eruption.

Photograph from Joseph C. Grew

THE BASIN OF WAIMANGU AND MOUNT TARAWERA

The basin is a two-and-a half acre hollow covered with black, steaming water. Tarawera is a three-peaked ridge, visible for miles in every direction, with its gaping summit and fissured slopes bearing witness to its prodigious eruption of 1886 (see text, page 109). It is estimated to have ejected a cubic mile of ash during its single explosion, the noise of which was heard 500 miles away.

Courtesy New Zealand Government

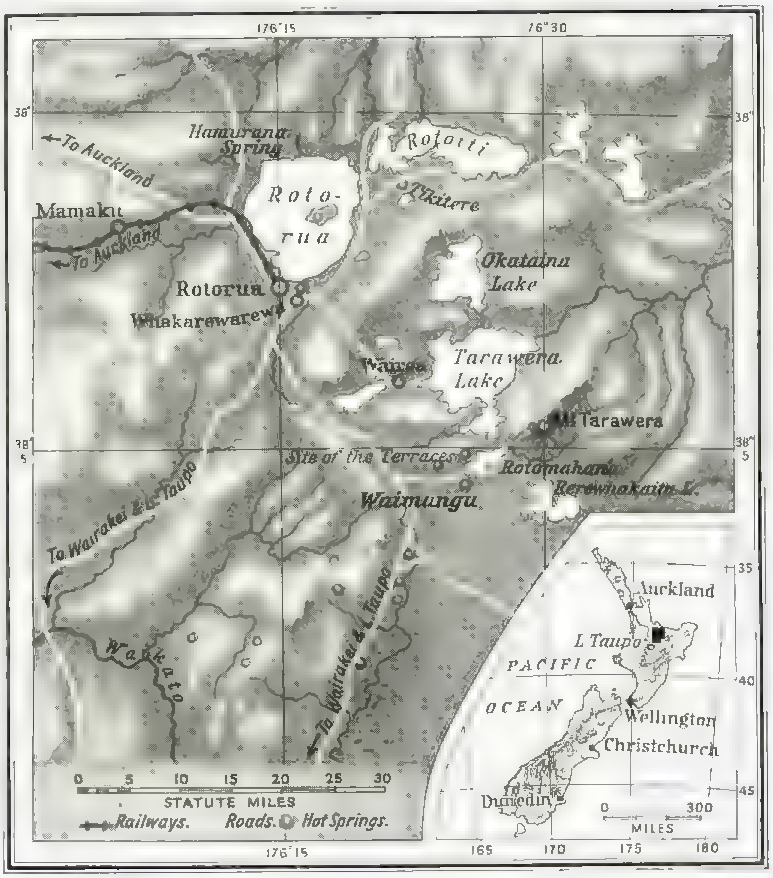
WAIMANGU IN ALL ITS GLORY

When this geyser was in its prime, black mud and stones, as well as scalding water, were flung to a height of 1,500 feet. After a long period of rumblings and boilings, it has resumed activity, though not on its previous imposing scale (see Editor's note, page 109). The hut whose peaked tip is seen in the right foreground was 550 feet above the water before its removal to a safer location. Note the three men in the middle distance

would first leap into action and proclaim its sovereignty.

Suddenly, in 1900, the outburst came. The quiet pool which lies within its crater was stirred, steam rose from its surface, and with no further warning the very bowels of the earth, as it seemed, were hurled through it into the air in one tremendous explosion.

Two men prospecting for ore in that uninhabited region saw the eruption and brought back the news that Waimangu had broken loose. New Zealanders henceforth could boast the greatest and grandest geyser in the world.



Drawn by Charles E. Riddiford

A MAP OF THE ROTORUA HOT SPRING REGION OF NEW ZEALAND

The black square on the North Island of the small inset map is the region shown in detail on the larger map. The eruption of Mount Tarawera in 1886 altered the face of this entire territory. It was not until 14 years later, however, that Waimangu came into action and established its preëminence among the geysers of the world (see text, page 109).

GEYSER TAKES TOLL OF THREE LIVES

It seems to have taken the people of Rotorua some little time to realize that, from the erratic and wholly ungovernable character of Waimangu, a near approach to its crater must at all times be attended with the greatest personal risk; for, although the explosions were soon found to come at average periods of 36 hours, irregular eruptions were of frequent occurrence and took place without warning, when least expected.

As is the law with all new dangers, somebody had to be hurt and sacrificed before steps were taken to prevent the ignorant and foolhardy from venturing too near.

In the summer of 1903 two girls and a guide visited the crater, and, though previously warned of the risk, they stood near the brink to secure a photograph at close quarters. An eruption occurred, the pond was thrown bodily into the air to a height of some 1,500 feet, with enormous quantities of mud, huge rocks, and steam, and the unfortunate visitors were caught by the back flow of the boiling water and swept down into the crater, from which the bodies were later recovered, terribly burned and mutilated.

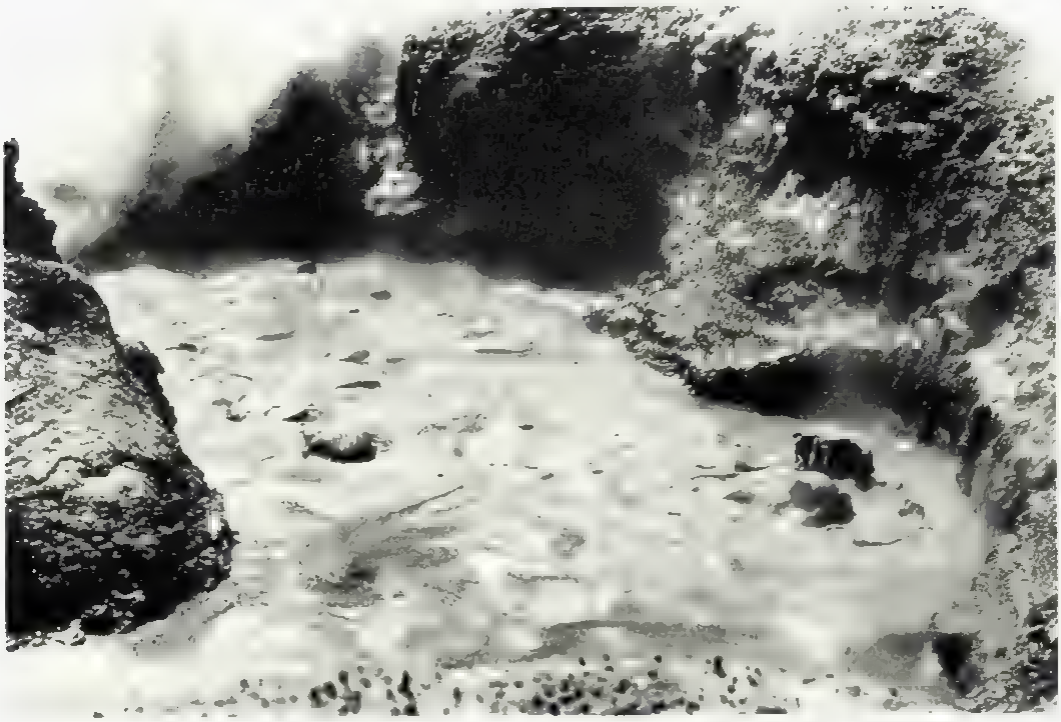
From that day the geyser basin was railed off in such a manner that nobody could approach near enough to incur the slightest danger.

It was but a few months before this mishap, in February, 1903, that, while staying at Rotorua, in the hot-spring district, my friend Mr. Bury Barry and I visited Waimangu. In those days the only warning of the risk of near approach was a small signboard affixed to a post

© F. G. Radcliffe

THE GREAT WAIRAKEI GEYSER IN ACTION

Fifty-two miles from Rotorua is an astounding locality crowded with a variety of thermal activities which cause the earth to quiver and throb. The show geyser of the Geyser Valley is the Great Wairakei, a hot-water regulator of Maoriland. It shoots from steaming cliffs reddened by oxidized iron, and its gusher plays at a height of 25 or 30 feet.



Courtesy New Zealand Government

THE PORRIDGE POT AT TIKITERE

"'The Devil's Porridge Pot' seethes and rumbles with some foul glutinous concoction" (see text, page 119), and is only one of the awesome features of Tikitere's numerous boiling mudholes, bubbling lakes of hideous colors, and hillsides erupting with steam blasts.

beside the path leading to the crater, which said simply, "Danger Limit." All questions as to the magnitude of the risk and the advisability of approaching nearer were left to the visitor himself.

What could be more innocent-looking than this little pond, set deep down in the rocky basin between the hills? What more unlikely than that it should choose the very moment when one was leaning over its brink, to explode?

So people argued, and so visitors, like ourselves, continued to come and approach near to its edge, little knowing that within a few short months Waimangu, like the dragon of old, was to rise without warning and levy a toll of three human lives for the privilege of beholding it breathe forth its smoke and steam.

If I had fully realized at the time the greatness of the danger, I doubt if I should have taken a photograph, on the very edge of the crater, or have paused for some time to watch the steam and bubbles rising from the pool's surface (see illustration, page 112).

But Waimangu was propitious to us. Although it had worked the night before and we had been told that we could venture into its basin with impunity, it exploded marvelously just after we had left the danger zone and climbed the adjacent cliff. But I am anticipating. Let me first describe the approach.

PASSING OVER TERRACES OF SULPHUR

The road through the hills from Rotorua toward Waimangu led us over the most desolate country; in all directions only the lava-formed, rolling wilderness was to be seen. Occasionally we passed terraces of sulphur, silica, and alum, where jets of steam or boiling mudholes further attested the volcanic nature of the land. So far as any natural, earth-like features were to be seen, one might have been in the nether regions.

Then, after scrambling up a steep hill to the westward of Rotorua, a superb view suddenly appeared. At our feet lay the azure surface of Lake Rotomahana, of such a blue as one sees portrayed and

Courtesy New Zealand Government

GATES OF HELL AND THE INFERNO, IN THE VALLEY OF TIKITERE: ROTORUA

This valley is a sepulchral spectacle of horror and desolation, with sulphur-stained mounds and banks, pools of boiling mud, and nauseating steam. The thick ledge of silica known as Hell's Gate is the steam-blanketed entrance to Tikitere and overlooks two boiling, muddy pools. The Inferno is an ugly basin of splashing mud and odorous steam and is afflicted from time to time with furious convulsions.

believes unreal, a turquoise in an old-gold setting, for the encircling mountains were bathed in the yellow haze of afternoon sunlight and rose as tawny protectors of their charge below.

Grim and foreboding in the background stood Tarawera, passive now and smokeless, brooding over her dark deeds of bygone years, dreaming, perhaps, of the day when power would once more be given her to rise and strike the land with terror.

From the hill beside Rotomahana we descended to Waimangu's basin. The boiling pool which occupies the center of the crater, some 300 feet in width, was quite still except for the bubbles which rose to its surface and the thin steam drifting lazily upward.

We passed the danger line, threaded our way carefully between the boiling springs, and then, climbing down into the crater, stood finally on the brink of the pool itself. One cares to remain but a moment in such a position, for although Waimangu had exploded during the night and was not actually due to work again for 36 hours, the thought of what would be our fate, should an irregular eruption occur, rendered the spot a peculiarly unattractive one and caused us to climb without delay back to the plateau, and on up to the cliff above the basin.

WAIMANGU GOES OFF

It was well that we did so. Scarcely five minutes had elapsed from the moment that we had stood within the crater. My camera was pointed down for a photograph from the summit of the cliff and I had made the exposure. Then, even before there was time to change the plate, the surface of the pool began suddenly to seethe. I heard Barry, at my elbow, shouting, "My God, man, the thing's going off!", but his voice was quickly drowned in the fearful uproar that immediately ensued.

Waimangu was in eruption. The formerly placid pond was shot, in one terrifying blast, into the air far above our

© F. G. Radcliffe

THE LAND OF NATURE'S FIRELESS COOKERS: WHAKAREWAREWA

At this ancient Maori village, a short distance from Rotorua, is a prodigious amount of hot mineral water. The houses are perched in flimsy fashion around, between, and sometimes upon, boiling springs and fumaroles. The thrifty, clever natives use these vents and springs as fireless cookers for their food, as washtubs, and for outdoor hot baths (see text, page 127).

heads—black water, black mud, black rocks; and, following them with the hissing of a thousand rockets and the roar of a thousand cannon, a burst of whitest steam quickly outstripped and enveloped the uprushing mass.

The explosion was awe-inspiring, terrible, grand beyond comparison. No more appalling, yet fascinating, spectacle can exist; no greater satisfaction can be experienced than to see such a phenomenon at close range. The sight is worth traveling thousands of miles over land and water to behold.

The outburst had taken place in the fraction of a second. Almost immediately we were pelted with the sand and small stones which fell, as the exploded mass shot back into its crater, causing us to take refuge in the shelter hut provided for that purpose on the summit of the cliff.

In a moment all was over; the pond regained its usual placid surface and no sign, save the continued shower of sand, told of the mighty eruption which had taken place. Silently we descended again to the basin, a little serious at the thought of what would have been our fate had the outburst occurred a short five minutes earlier. It is well indeed that visitors may now no longer approach within the zone of danger.

ROTORUA IS ONE OF NATURE'S GREAT SANITARIUMS

Waimangu, though the greatest, is by no means the only feature which renders New Zealand a wonderland of never-failing interest. A bad attack of malarial fever, contracted in the jungle of the Malay Peninsula, took me down there one winter to try to get the poison out of my system.

It was a long journey—seven days from Singapore to Ceylon, three weeks more to Sydney, and a final four days to Auckland, whence the railroad brought me to Rotorua, in the hot-spring country.

If, after the long, lazy sea voyage anything remained necessary for my complete recovery, a few weeks in the clear and bracing atmosphere of New Zealand quickly accomplished it. Nor did I have to number myself among the many invalids who come to the hot-spring region for the wonderful curative powers of its mineral baths, since Rotorua is famous

Photograph from The Brett Company, Auckland

THE GAS-SWEPT SUMMIT OF NGAURUHOE

In Tongariro National Park, "a gift of burning mountains" made to New Zealand by a Maori chief, is Ngauruhoe, the youngest of the dominion's volcanoes. It is a symmetrical cone 7,515 feet high, with a crest occupied by a spacious crater containing two smaller craters. These vents discharge sulphuric acid fumes with much noise and force.

for its healing springs and baths of water, mud, and vapor.

If you are affected with gout or rheumatism, you will spend most of your time in the well-known "Priest's Water"; or, if something is to be desired in the smoothness of your skin or the loveliness of your complexion, the "Rachel" bath, according to tradition, will make you beautiful forever.

But, so far as combined benefit and enjoyment go, you will find more absolute pleasure by passing all your available moments in the big, hot sulphur swimming pool, where you can float lazily for hours at a time in water above 100 degrees Fahrenheit, and leave it feeling as vigorous and energetic as though newly wakened from a refreshing sleep.

FIRE AND BRIMSTONE

As the traveler approaches Rotorua a strange, unearthly smell of sulphur fills the air; white puffs of steam rise, for no visible reason, from green hills and valleys; huge mudholes by the roadside seethe and bubble like porridge in a caldron; hot lakes of extraordinary colors—yellow, blue, pink, green—and brilliantly colored strata along the mountain sides make you stare and rub your eyes to be sure that such apparent unrealities exist.

Your nearest conception of an orthodox hell will be truly realized when you enter the Valley of Tikitere, some ten miles from Rotorua. The earth is hot beneath your feet, the country gapes with steaming cracks, and if a cane is thrust a few inches into the soil a jet of steam or a spout of boiling water reminds you that, just beneath, the very bowels of the earth are seething toward the surface.

You are surrounded by an inferno of boiling mudholes, bubbling lakes of hideous colors, and blasts of steam issuing from the hillsides with the regular exhaust of powerful engines.

Follow the guide closely, for a single misstep may land you in some loathsome abyss, and there are pleasanter ways of reaching eternity.

Here, the guide points out, are the "Heavenly Twins," two horrid bubbling mudholes side by side, one of which boils the thickest of brews, while its twin contains the thinnest. On one side "The Devil's Porridge Pot" seethes and rumbles with some foul glutinous concoction; on the other you look down through the "Gates of Hell" into a slimy lake, whose thickened waves rise and recede, as if about to break upon the banks above, and whose sulphurous fumes send you back, gasping for a breath of pure air (p. 116).

FROM AN INFERNO TO A VERNAL PARADISE

But heaven and hell rub elbows in this country. Let's have a look at some of its more cheerful features. We will leave behind the boiling mud, uncanny jets of steam, and sulphur-laden air, and cross over to Rotorua Lake, where the fresh breeze washes the poisonous fumes from our lungs and cools our skins from the burning breath of those horrors behind.

A small steamer carries us across the rippling lake, dotted with the white sails of Rob Roy canoes and knockabouts, passes between green islands, and lands us in thick woods on the opposite shore, where we enter a rowboat and proceed lazily up an enchanted river to a fairyland of extraordinary beauty. The banks are thickly grown with great, overhanging trees, blossoming shrubs, ivy, and tall ferns, which shade marvelously clear depths of opalescent color.

Suddenly the river narrows, turns, and stops short, cut off and walled in by the same luxuriously wooded banks. For a moment we are astounded that a flowing stream should come so suddenly to an end, until we look over the boat's side and see far below, through the transparent water, a jagged opening in the bed of the stream, from which great quivering volumes of ice-cold water well up to the surface, glancing with rainbow colors and shot with arrows of crystal light.

Now we see the cause, for this is the famous Hamurana Spring, the source of the beautiful river, which flows full grown from this hidden wooded spot down into Rotorua Lake—a spring from which 5,000,000 gallons are poured forth every 24 hours. Looking into its depths, we can see delicate shells, and ferns growing far below, which, from the perfect transparency of the icy water, appear almost within reach.

The force of the uprushing torrent is so tremendous that coins which are

© International Press Photo Co.

A NATURAL SULPHUR FACTORY: WHITE ISLAND

This isolated, seagirt crater lies 27 miles from North Island's mainland, in the Bay of Plenty. It is a bed of hot sulphur, whose crusty, treacherous surface breaks under the visitor's feet and whose acids eat up shoe soles and clothing. The island's shores are difficult of approach and it is often necessary to wait for a favorable sea.

© F. G. Radcliffe

WHANGAREI FALLS, NORTH AUCKLAND

Luxuriant and perpetually green forest settings frequently enhance the beauty of many of New Zealand's scenic charms. The trees are usually tropical rain forest types, massed here and there with brilliant flowers. The forests are also distinguished by a wealth of tree ferns, filmy ferns, lianas, massive perching plants, and mossy carpets.

Photograph from A. S. Graham, Wairakei

THE TWINS GEYSER IN A DORMANT MOOD

The Twins are two gushers playing from the same pool. The stronger bursts explosively; the other, sounding like a paddle wheel, plays less frequently. Wairakei's famous valley has many medicinal hot springs, but is most noted for its beautiful, fantastic geysers, some of which are always playing for the visitor.

thrown in will remain suspended halfway to the bottom, and finally drop to one side of the spring, where they lie glittering below.

The Maoris, who are expert divers, have tried again and again to reach this tempting store of treasure, but have never succeeded, except by working in pairs. One man jams a pole into a crevice. His companion, grasping the pole firmly, is thus enabled to withstand the force of the water as he descends. We will pass half a day and have luncheon near this beautiful spot, and then, in the afternoon, ride over to the geyser region of Whakarewarewa, a small Maori settlement on the other side of Rotorua.

The country here is less fearful than at Tikitere, but none the less active for all that. Within a radius of less than 100 yards, some ten or twelve geysers play at intervals ranging from two minutes to

© International Press Photo Co.

A MUD VOLCANO IN THE WAIOTAPU VALLEY

Over the scrubby surface of Waiotapu, 21 miles from Rotorua, run hot-water creeks, and early on a frosty morning the visitor sees steam columns, rising like fog from a swamp, ascend in every part of the valley. It contains the largest mud volcano in the thermal district. Cliffs of pure yellow sulphur and beautiful terraces of silica are also to be seen in this region.

several hours, and the display, when several of them happen to be in action at the same time, is most effective.

SOAPING A SLUGGISH GEYSER TO MAKE IT SPOUT

When Waikite, the famous twin geyser, ceased working it was succeeded as queen of Whakarewarewa by Wairoa, but even Wairoa plays no longer of her own accord. Only under the inducement of a plentiful supply of soap does she consent to perform for the curious multitudes.

As is well known, too much soaping of a geyser causes it eventually to cease its action altogether, so that the practice becomes an important ceremony. In the Rotorua thermal country it is allowed by the government only when some distinguished visitor comes to see the display.

I was fortunate in being on hand when Wairoa was thus induced to play for the

Photograph from The Brett C[illegible], Auckland

YACHT-RACING IN RANGITOTO CHANNEL: AUCKLAND

Rangitoto Channel, lying between the mainland and the volcanic island of that name, is the principal approach to Auckland's spacious harbor. In fact, the city has two harbors, one communicating with the Pacific, the other with the Tasman Sea. The numerous bays and inlets of the first form a paradise for yachtsmen.

Courtesy New Zealand Government

WOMEN POI DANCERS AT MAKETU

The *poi*, or canoe, dance is performed by a number of girls. The movements portray the launching of a canoe; its buffeting, tossing, and capsizing by a storm; its righting and triumphant progress over the waves, ending with its safe arrival on the beach. To suggest the sound of the paddle stroke, each dancer twirls and strikes together two poi balls, made from the leaves of the *raupo* (a common cat-tail or reed mace), to which a flax cord is attached. The stripped-flax dancing skirt makes a sound like that of water lashing against the bows of a canoe

Photograph by Dr. Carlos E. Cummings

A GREETING IN THE APPROVED MAORI FASHION

In the *hongi*, noses are pressed, rather than rubbed, gently from side to side and right hands are clasped. At family reunions or at parties the hongi is prolonged and, after lengthy separations, it is accompanied by tears and moans. These little girls are standing against a background showing a Maori carved slab and other designs of native house decoration.

Photograph from Herbert E. Gregory

THE LATE KING MAHUTA SPEAKING AT A MAORI COUNCIL

The Maoris are proud of their right to vote and of their membership in the New Zealand Parliament. Though subject to the dominion's laws, they are governed in great part by their own chiefs. Most of the native men and women now wear European dress.

son of a former premier of New Zealand. The wooden cover, always padlocked over its mouth, was solemnly removed, the crowd warned to stand back out of danger, and a bag of bar soap thrown into the diminutive crater.

Almost immediately the water foamed, lathering up to the edge of the siliceous opening, but not until almost 20 minutes later did the actual playing begin. There was a deep rumbling below, a choking, gurgling noise came from the depths of the crater, and, with a last grand roar, Wairoa shot into the air, full 130 feet, a graceful, slender column of whitest steam and water, breaking at the top into silvery feathers which drooped, dissolved, and drifted off into the sunlight.

NATURE'S MATCHLESS FIRELESS COOKERS

If it should occur to anyone to wonder why a town like Whakarewarewa should be built in the midst of this hot-spring terrace, with boiling pools between the very houses, and steaming holes scattered about so plentifully that a visitor must look pretty carefully where he walks lest he disappear into one of them, the answer is almost too obvious. The Maoris are a thrifty race; coal and firewood are expensive; stoves rust and kettles require tending. Then why go to superfluous expense and trouble, when Nature has supplied not only fuel but stoves in the form of constantly simmering kettles, all as free of charge as sunlight and fresh air?

Here, at the very doors of the natives, these steam holes, or fumaroles, are at all times ready for use. Over the openings are placed small, slat-bottomed boxes; the food to be cooked, wrapped in leaves, is placed within. Soon an appetizing smell announces that dinner is ready (p. 117).

If other domestic cares delay the dinner hour—if the father of the family is late, or the baby has fallen into a mud bath and requires a precipitate change of garments—no penalty is imposed in the way of a burned meal; for, the stew having been cooked and the soup boiled, they simply remain there, as in an oven, keep-

Photograph from The Brett Co., Auckland

MAORI WOMEN'S CANOE RACE: NGARUAWAHIA

This former capital of the Maori Kingdom, at the junction of the Waikato and Waipa rivers, holds a picturesque Maori carnival once a year. On St. Patrick's Day thousands of natives and sight-seers gather to view races between war canoes, canoe hurdles, stirring war dances by the men (see page 129), and the graceful poi dance (see page 125) by the women.

ing nicely hot, but suffering no extra scorching as a result of the delay.

And as for the Monday clothes washing, why, it is simply a question of kneeling beside one of the big hot pools and sousing the garments until they are as white and clean as new. True, both clothes and dinner may savor more or less strongly of sulphur; but who so fastidious as not to be able to cultivate a taste for sulphur as easily as for any other spicy flavor?

The Maori, I say, is of a thrifty race; yet that is the least of his attributes. No brown man possesses more personal and national pride, more true dignity, fearless bearing, honorable and faithful instincts, and cheeriness of temperament. There is no fawning, no bowing and scraping, in his attitude toward the colonizers of his country, and all his dealings are marked with straightforward manliness.

Mentally he is keen, physically superb. I know of no more stirring sight than the *haka* war dance, in which the most powerful men of a village, stripped to the waist to give better play to their great muscular arms and bodies, form in even ranks, and, taunted with cowardice in pantomime by their women, commence muttering in deep voices, wave their arms and twist their bodies in fierce unison, as though writhing under the bitter insults.

The taunting continues, the muttering, growing louder and more ominous, becomes a roar; slowly they work themselves up to a tremendous pitch of excitement, bellowing more and more threateningly, swaying and twisting with greater and greater fierceness, till the onlooker becomes positively terrified in spite of himself.

Then, suddenly, with a last grand shout, they break their ranks and dash headlong to meet the imaginary foe.

THE WOMEN ARE LITHE AND GRACEFUL

The women are no less dignified and proud of bearing than the men and exhibit a grace of movement and litheness

Photograph from H. E. Partridge

MAORI WARRIORS REHEARSING A HAKA (SEE ALSO TEXT, PAGE 128)

In the rendering of a *haka*, or war dance, the Maori wears a kilt of flax, stripped and dried. Some of it is scraped at intervals, so that the textures, alternately stiff and soft, permit flexibility during the various agile movements of the dance. The weapon brandished by these warriors is the *tewhatewha*, which is about four feet long. One end has a point, the other a hatchet-shaped blade. It is said to have been used by the leaders. These warriors fought against the British in the conflicts between native and settler from 1861-1871.

of body unknown in any but South Sea races. Were it not for the tattooing of the lips and chin after marriage, many of them would be extraordinarily beautiful.

Their speech, as is that of the men, is delightful to hear, since it totally lacks the harsh, guttural tones of the Arab and Hindu. Their history is full of folklore, handed down from age to age, every landmark and custom having its own particular myth.

Some of their customs are very amusing, and one can scarcely repress a smile to see the women saluting their friends in the street by rubbing noses. They carry the babies slung upon their backs, as do our Indian squaws their papooses. Indeed, in the Maori, one is constantly reminded of the American Indian.

HIGH CARNIVAL AMONG THE MAORIS

On Rotorua Lake, once a year, high carnival is held. From all the villages of the surrounding country come the Maoris with their babies, tents, pots and pans, to camp on the shores of the lake and make merry after the fashion of all nations and all ages.

There is foot-racing on the beach, yacht-racing on the lake, and horse-racing on the track behind the town, but what delights the Maori heart above all else is the great race between the representative war canoes of the various villages, which takes place on the last day as the crowning event of the celebration.*

It is a fine sight to see these great canoes, manned by from forty to fifty stalwart men, paddled like mad across the big lake for the honor of their respective towns.

The captain of the crew stands in the center to give the stroke; the men, all in uniform, keep the pace with a dash and

* See also "Hurdle Racing in Canoes: A Thrilling and Spectacular Sport Among the Maoris of New Zealand," in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1920.

Courtesy New Zealand Government

A MAORI BELLE IN NATIVE DRESS

Many of the younger girls are beautiful, since they do not mar their looks by tattooing their lips and chin, according to the ancient fashion. They are especially proud of their long, luxuriant hair. The Maori boys and girls of to-day have lost interest in their native songs and legends and enjoy modern dances and motion pictures.

snap worthy of tried athletes, and great is the rejoicing over the winners.

"THE CHASE FOR A MAORI BRIDE"

Then there is the Ha Kahaka Tamahine, which, being interpreted, means "The Chase for a Maori Bride." The selection of the young maiden, or *wahine*, for this event is no easy task, for she must be the most beautiful of all the girls in the surrounding country, and beautiful Maori girls are the rule, not the exception.

The lucky maiden is put in the bow of a small, very swift canoe and her brother or some other relative takes his place in the stern to paddle her through the chase which ensues. As they appear on the course before the crowds who throng the beach, a tremendous cheer goes up, and it is not difficult to see that this happy little wahine is popular as well as lovely.

Hardly have the wahine and her relative taken their places near the starting post when the canoes of the chasers shoot out to their respective stations. Each is very fast and light and paddled by five or six men, with a vacant place in their midst for the bride, in case she is captured before reaching the finish line.

At the signal, the bride's canoe dashes away down the course, followed a minute later by her pursuers. The object of the chase, as is soon evident, is to overtake the maiden, lift her from her own craft into one of the places left vacant for her in the canoes of the contestants, and carry her over the course to the finish line.

The crew which makes the capture at once becomes the object of pursuit for the others, who in turn try to overtake the bride.

The crew which finally succeeds in carrying her across the finish line is proclaimed the winner; but whether or not the lady chooses her husband from the winning boat is a delicate question, which does not, I think, enter into the conditions of the race itself. At any rate, the bride is landed on the beach and has to run a gauntlet of deafening applause from enthusiastic thousands.

Our stay at Rotorua must, like all good things, come to an end at last. Rising very early one morning, we take a regretful leave of the mist-wrapped lake and the steaming terraces and hillsides, whose beauties and horrors alike have been a source of such keen interest; we are whirled off over the lava-roughened hills, past Waimangu, past old Tarawera, and so down through the fern-clad jungles to Wairakei, Lake Taupo, and the Wanganui River, where new scenes of undreamed-of beauty await us in this imperial wonderland.

TRIPOLITANIA, WHERE ROME RESUMES SWAY

The Ancient Trans-Mediterranean Empire, on the Fringe of the Libyan Desert, Becomes a Promising Modern Italian Colony

By Colonel Gordon Casserly

Indian Army (Retired)

ON a low, sandy promontory of the North African coast stands the white city of Tripoli, capital of Tripolitania, the western province of the Italian colony of Libya, which lies between Tunisia and Egypt (see map, page 138).

As the traveler approaches from the sea, the tall, slender minarets of the city's numerous mosques, rising high above the flat-roofed houses of the native town and the newer buildings of the European quarter, and its setting of white sand dunes and green oases of palm groves and gardens give it a more truly African aspect than its sister cities of Tunis and Algiers.

Yet, when the steamer rounds the mole and enters the spacious new harbor, the stone-embanked esplanade, with ornamental balustrade and tall electric-light standards, and the large, modern buildings beginning to fringe the broad promenade, have nothing that is not European, except the Moorish style of architecture of the new and imposing Grand Hotel. Even the storied old castle in the center of the esplanade is not Eastern, although for centuries Arab beys and Turkish viceroys, having turned the Knights of Malta out of it, lived there in state.

In 1911 the Italian flag replaced the crescent and star, and Rome of To-day took back the city that, from the fall of Carthage to the coming of the Vandals, had acknowledged the rule of Rome of Yesterday.

THE OCCIDENT ELBOWS THE ORIENT ON TRIPOLI'S MAIN STREET

But only the sea front and the first two streets behind it are modern. The remainder of Tripoli looks much as it did before its latest conquerors landed.

Even in the principal street, lined with cafés, banks, the post office, governor's palace, shops, and offices, strings of camels lounge disdainfully past automobiles. Arabs and Negroes, wrapped in the universal dingy white woolen shroud called *barricano*—the burnous is seldom worn—shuffle by groups of smart Italian officers in khaki and silver and Fascisti in black shirts and caps. Arab and Negro women, with only one eye peering from beneath an all-enveloping cloak, use that eye to stare at the short skirts and silk stockings of European ladies. Thus East and West meet.

CHANGING THE GUARD IS A PICTURESQUE CEREMONY

The main street continues beyond the massive stone bulk of the castle, whose exceedingly high walls tower above all other buildings in the town, old and new, a reminder that in times past its lord held his subjects in the hollow of his hand—and in the fear of his guns!

The castle suffered in the bombardment by the Italians in 1911, but its new masters have restored it. It is no longer a citadel, but a relic, and now contains the office of the governor, the headquarters of the police, and some other public departments, lodged high above the city, in quaint arcaded courts (see page 132).

But its gates are held by soldiers, white, black, or brown, according as an Italian regiment, a Negro battalion from Eritrea, or an Arab corps recruited in Tripolitania furnishes the guard for the day.

At the main portal opening on the principal street an interesting military ceremony takes place every afternoon (page 136).

From afar is heard the harsh notes of brass trumpets, the roll of drums, and a weird wailing, as of bagpipes. Down the street, headed by a band, comes a

Photograph by Gordon Casserly

THE OLD CASTLE: TRIPOLI

This stronghold has had a part in the making of history for many centuries. In 1551 the Turks took it from the Knights of Malta and Turkish viceroys, and Arab beys later lived there in state. In 1911 the Italian flag replaced the star and crescent. The once great citadel is now used to house some of the provincial government offices.

small column of troops. They belong to a *battaglione libico*—that is, a battalion of Arabs of this Tripolitanian province of Libya.

They are dressed in a dark-brown shade of khaki, with black-tasseled red fezzes, and their leather belts are buckled over broad, woolen cummerbunds of a regimental pattern of tartan, green, yellow, red, blue, or some other blending of colors that would astonish a Highlander.

The instruments are short reed flageolets, which sound not unlike the Scotch pipe, but are without the drone; nor, to the untrained ear, does the Arab music played on them seem very different from that of the bagpipes.

Behind the pipers come drummers, followed by trumpeters with long brass instruments, on which, in turn, is blown a bugle march. A company color standard, borne aloft, heads the men of the main guard behind the musicians.

The sentry at the castle gate is a trooper of an Arab cavalry corps. He wears a white cotton uniform, pale-yellow zouave jacket, and a red fez. As the column approaches he turns out the guard, which falls in on one side of the gate.

The band wheels into place beside it, and the new guard halts, facing the old guard. Arms are presented, the trumpeters blow "The Salute," and the band plays the Italian national anthem, at which soldiers and civilians passing by halt, stand at attention, and salute. Even carriages stop and ladies in them stand up.

Then the hymn ceases, all pass on their way, the guards change over, and the one relieved marches off behind the band.

This day both detachments have been of the Arab corps. To-morrow the relief may be men of an Italian infantry regiment (p. 136), or of an Eritrean battalion of tall, thin, black soldiers with high red fezzes and gay-colored tufts on top, khaki uniforms, puttees, and bare feet.

A PLUNGE INTO ARABIAN NIGHTS

Away from this main street, one plunges into the Arabian Nights. Here an arched entrance leads to a narrow, roofed alley, with apertures in the top for light. On either side of it are dark, cavernlike

THE NEW SEA PROMENADE: TRIPOLI

This seaport was once a stronghold of those fierce Barbary pirates who for centuries proved a scourge to the shipping of the Christian world. Their depredations to American commerce finally brought on war, and it was here, in 1804, that Commodore Decatur recaptured and burned the American frigate *Philadelphia,* which had gone on the rocks and been taken by the pirates.

Photographs by Gordon Casserly

THE WATER FRONT OF TRIPOLI WITH A GRACEFUL MINARET IN THE DISTANCE

Under the Turkish régime the many mosques of Tripoli were jealously closed to the unbeliever. Now, however, it is possible to visit many of them, one of the most interesting being the Mosque of Dragut, burial place of the pirate of that name, whose chief claim to fame was that he provided the material for and built a mound of Christian skulls by the seashore at Djerba.

Photograph by York and Son

THE CITY GATEWAY: TRIPOLI

The metropolis of Italian Libya was probably founded as a trading post by the Phœnicians of Sidon long before the Christian Era. It has been held in turn by Carthaginians Numidians, Romans, Vandals, Byzantines, Arabs, Berbers, Normans, Spaniards, and Turks. It now renders allegiance to the King of Italy.

Photograph by Gordon Casserly

THE ARCH OF MARCUS AURELIUS: TRIPOLI

The remains of this noble white marble monument to ancient Rome's philosopher emperor stand on a street near the harbor (see text, page 149).

openings, in each of which sits a native at a hand loom, weaving scarfs or long pieces of silk striped in bright colors.

Near by is a similar arcade, in which each cave is filled with Oriental carpets, rugs, and round leather cushions with gay designs. Only one of the sellers is modern enough to invite a passing European to inspect his stock; others recline silently at their ease, waiting, like true Easterners, for customers to come to them.

Out of the darkness of these arcades one passes into the brilliant sunshine of a narrow lane of dull, two-storied whitewashed houses. Only the door and one or two tiny, barred windows break the blankness of their walls.

One half-open door gives a glimpse of a square courtyard inside, with pillared arches supporting a gallery on which all the rooms open, well lighted by windows looking on the sunny court. From the outside one would never suspect the brightness of the interior of these Arab houses.

Along the narrow alley lurches a silent-footed camel, laden with bulky bales of wool, which almost touch the sides of the lane and force passers-by to take refuge in doorways.

Everywhere is a maze of similar streets. The majority are lined with dwelling houses, in some of which larger windows on the front and an occasional balcony show where a poor Italian or Maltese family lives among the natives.

But there are a few shops. Here is one selling vegetables. Its Negro owner dozes among baskets of carrots and cabbages and pumpkins of incredible size, almost big enough for Cinderella's coach.

CAFÉ PATRONS SQUAT ON THE FLOOR

Farther on is an Arab café, merely a dingy room lighted only by its door opening in the lane. Inside, a brick fireplace has a pot of coffee boiling on a handful of charcoal. A lean Moslem dips the thick, black liquid out with a long-handled measure, from which he pours it into tiny cups handed by a dirty-faced boy to customers squatting on mats on the floor.

A grating, grinding noise. Through an open door one peers into a dark, low-

GUARD MOUNT BEFORE THE CASTLE GATE: TRIPOLI

The changing of the guard is a colorful ceremony, accompanied by blare of trumpets, roll of drums, and the shrill, weird wail of flageolets (see text, page 132).

Photographs by Gordon Casserly

THE PRINCIPAL STREET OF THE NEW EUROPEAN QUARTER OF TRIPOLI

This thoroughfare has little about it to suggest the East. The broad pavements, electric lights, telephone wires, and thoroughly modern governor's palace, in the left foreground, bespeak the extent to which this section of Tripoli has become Italianized.

ceilinged room on the street level. Round and round stalks a camel, a piece of sacking tied across his eyes. He is harnessed to a long beam, turning the millstones in the center of the room, which grind the grain dropped into the hopper. The flour pours out on to a cloth on the floor, from which a man from time to time scoops it up. Mechanically, undriven, never stopping, the blindfolded animal stalks round its dungeon.

In the next lane a brawny Negro baker sits beside a large oven which occupies the entire front of his shop. Jewish children squat on the ground before him, each with a small board. On some of the boards are lumps of dough ready for the oven, while others are empty, ready to receive the baked loaves. To-morrow is the Jewish Sabbath, and here the bread for it is being baked. At intervals the baker gets up, opens the oven door, thrusts in a long-handled wooden spade, and brings out a couple of crusty loaves. He hands them to a waiting child, then puts in a few more lumps of dough (see illustration, page 150).

ARAB WOMEN ARE SELDOM SEEN IN THE STREETS OF TRIPOLI

Hardly ever is an Arab woman to be seen in any of the streets. An occasional fat old negress, to judge by the color of her hands, ankles, and bare feet—not an inch of skin being visible around the one eye showing between the gathered folds of the striped black-and-white cloth shrouding her head and bulky figure—waddles by or stops to bargain at a shop.

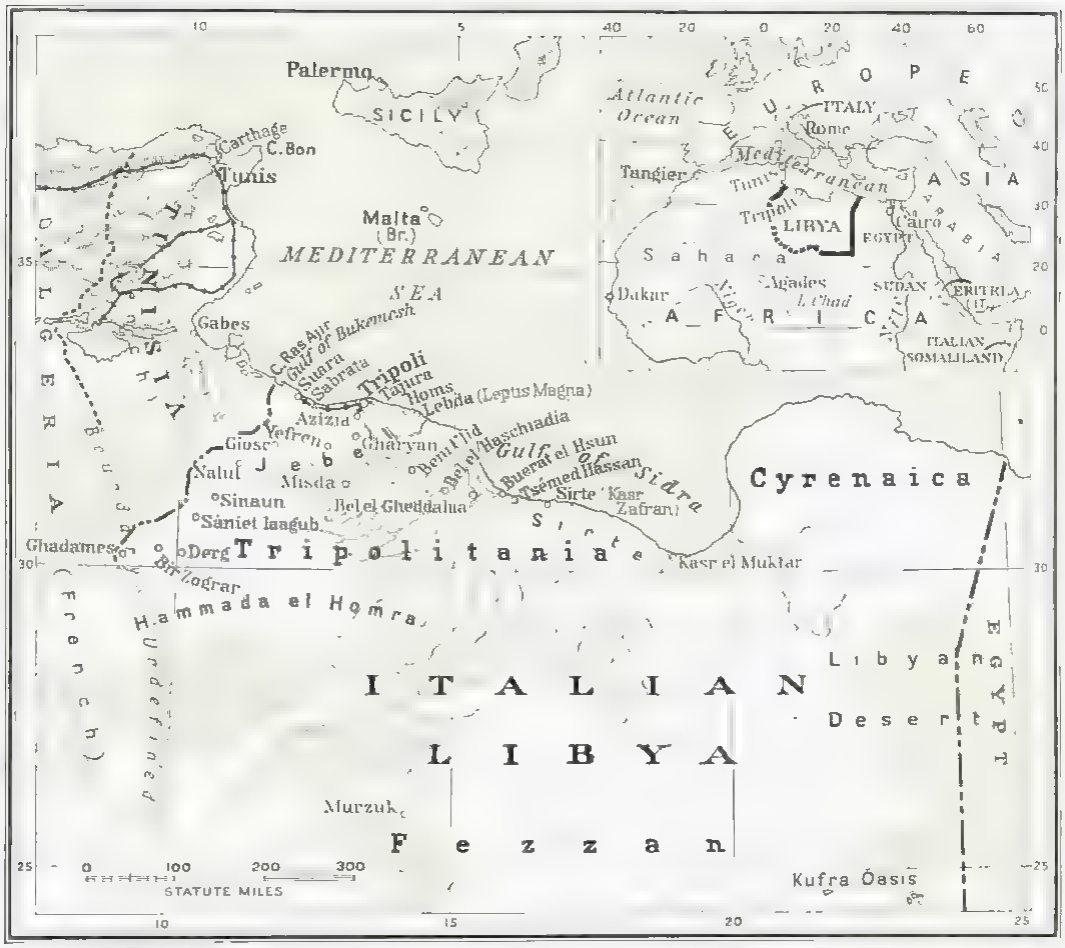
Around the next corner is the Jewish quarter. A stranger would hardly realize the fact at first, for all the men wear the Moslem red fez. But in the doorways stand groups of gossiping women with faces exposed to view, a proof that they are not Mohammedans. They are Jewesses, descendants of managers and employees of trading stations established here by the Phœnicians a thousand years before Christ, or of refugees from fallen Jerusalem.

They are surprisingly light-complexioned, much fairer than many of the Sicilian and Maltese women living around them. When young they are often quite pretty, but with advancing years they are apt to get very fat.

Photograph by Gordon Casserly

AN ARAB SOLDIER

Italy is turning to good account the martial instincts of the restless sons of the desert. They constitute an important factor in the maintenance of order in Libya.



Drawn by Charles E. Riddiford

A MAP OF ITALIAN LIBYA

This flourishing colony of modern Rome is divided into four zones. The first is the sandy, undulating coastal plain, with many rich oases, and cultivable everywhere because of the never-failing supply of underground water at from 60 to 150 feet. The second is the low mountain chain called the Jebel. The third zone is inland desert, and beyond that the irregular tableland, seamed with deep beds of long-dry rivers, at present unoccupied by the Italians.

Nowadays, some of the richer and more modern Hebrew families have adopted European dress and ways. At receptions and balls in the Club of Jewish Youth their girls, in smart toilettes, dance the fox trot and one-step with Italian officers, and with young men of their own race in dinner jackets or lounge suits.

But the majority of the Jewish women in Tripoli retain their picturesque Eastern garb, and on the Sabbath the dingy alleys are enlivened by vivid hues. They wear loose-sleeved, short bodices of pink, blue, white, or some other cheerful color and straight-hanging silk skirts, white, striped black-and-white, or of even gayer tints (see Color Plate III). Their dark hair is bound in bright silk kerchiefs. Many go barelegged and thrust their feet into heelless slippers, but some adopt silk stockings and smart, high-heeled shoes.

The men have more typically Jewish features and wear Oriental dress—red fez, long shirt hanging outside the trousers, a sleeveless, open waistcoat, and perhaps a long, black, single-breasted coat reaching below the knees, with bare feet in heelless slippers, or in socks and European boots (see page 151). Outside Tripoli many Jews are in garb indistinguishable from that of the Arabs.

As in Morocco, many of the trades are almost exclusively in Jewish hands, such as iron-working, cobbling, making jew-

Photograph by York and Son

A VAULTED STREET IN TRIPOLI

In a land where the fierce rays of the sun beat down with merciless intensity, these vaulted thoroughfares provide a degree of shade not to be disdained. To the right and left, in dark alcoves, are the shops of native merchants (see text, pages 132 and 135).

elry, and working in precious metals. Agriculture and stock-raising are left to the Arabs and Berbers.

TRIPOLI'S NEGROES PERFORM ANCIENT DANCES AT THEIR OWN MOSQUE

As in Morocco, the Jews are desirous of education for their children and have some good schools. I noticed the boys of one of these walking two and two through the streets, garbed in a close imitation of the Italian naval officer's uniform—their school dress.

There are many Negroes in Tripoli, descendants, as a rule, of slaves brought originally from the Sudan. Owing to much intermarriage with the Arabs, they have lost their distinctive facial features, but retain their color and characteristic hair. Despite the intermingling and the adoption of Arab dress, they hold to some of their customs and celebrate their feasts

with the same dances performed by their race in the Sahara and Sudan to-day.

On the sand dunes outside the new walls of the city stands the Negro mosque, where I witnessed one of their festivals. As I approached the white-domed building several Negroes, wrapped in the universal barricano (see text, page 131), rode past me on bicycles and stacked their vehicles on the open ground before the mosque, where most of the black population of Tripoli, male and female, had gathered.

In an open space in the center of the crowd were planted two colored flags on staves tipped with brass balls surmounted by star and crescent—holy banners, these, to be carried in processions. Near by a group of men, in red fezzes and colored waistcoats over white garments, was dancing to music made by an orchestra of large hand drums similar to tambourines.

From time to time some of the dancers dropped out, exhausted, and others rushed in to take their places.

At the conclusion of the dance the women, with faces for once exposed, gathered together. Most of them were fat, many were old. Some had a magnificent display of gold and silver jewelry around their necks, in their ears, and on their ample bosoms. Their fingers were covered with rings, and broad bracelets adorned their arms almost up to the elbows.

They passed into the courtyard, and emerged later to form around the flags. Two of their number pulled the banners out of the sand, shouldered them, and marched off, behind musicians, to the city gate, followed by the other ebony ladies wrapped in voluminous white or black-and-white striped cloaks. A few were too superior to walk in the procession and hired victorias to take them back (p. 152).

All night parties of Negroes marched about the narrow lanes of the native quarter, and the drumming and shouting were kept up until dawn.

TRIPOLI PRAYS IN MANY MOSQUES

Tripoli has many mosques, each with its distinctive, graceful minaret, generally tipped with green tiles. Five times each day—at dawn, noon, vespers, sunset, and evening—the tiny figures of the muezzins pass around the gallery of the slender spires and lean over to give in high-pitched voice the call to prayer.

The roofs of Tripoli's mosques differ from the usual model in not having the conventional large dome. Instead, they are flat, with a number of very small cupolas rising in lines.

The principal mosque belongs to the family of the Caramanli, formerly the rulers of Tripoli. Under the lengthy portico of the outer wall along the street, a number of men sit all day. They make the white, round caps worn here by the poorer Moslems instead of the fez, which, being manufactured in Europe, costs more.

The gate in the wall leads into a courtyard with a cloister running down the sides of the sacred building. One portion is railed off and filled with tombs of past generations of the family, those of men being marked by the carved turban crowning the headstone.

In a corner of the court rises the tall, slender minaret, with an inner stair winding up to the gallery, which furnishes a fine view over city, dunes, oases, and sea. Near the base of the minaret is the ablution basin, where Moslems perform the ritual washing before entering the mosque.

The interior of the sacred fane is many-pillared, lofty, and imposing. The high *minbar*, or pulpit, with its marble balustraded flight of stairs, is a gem of artistic carving, inlay, and mosaic.

Beyond the Jewish quarter lies part of the old city wall, allowed to stand as a historical relic on the sea front past the harbor; between it and the rock-studded water runs another long, balustraded promenade.

The ancient rampart was replaced after the Italian occupation by a much wider loopholed and bastioned stone wall, cutting off the sandy promontory on which the city is built. It incloses a far greater space and includes an oasis of vegetable gardens and palm trees, watered by many wells (see illustration, page 156).

But the gates now stand open and unguarded day and night, for during the last two years the valor of the Italian and

Autochrome Lumière by Luigi Pellerano

A SPAHI, OR NATIVE CAVALRYMAN, OF TRIPOLITANIA

In maintaining their control over Libya, the Italians employ Arabs, Italian infantrymen, and black soldiers from their colony of Eritrea, on the Red Sea. Note the wide stirrups and high pommel of this cavalryman's saddle.

© Autochrome Lumière by Luigi Pellerano

VEILED MEN OF THE SAHARA

As a protection against sun and sand, the Tuaregs wear a face cloth, which is seldom removed. Even the Arabs, to whom the veil is not unknown, call these Berbers from Murzuk, "People of the Veil." Nobles wear blue face cloths and the lower classes wear white. Note the curious Tuareg saddles.

©

Autochrome Lumière by Luigi Pellerano

YOUNG WOMEN OF TRIPOLI IN HOLIDAY DRESS

Among the 60,000 inhabitants of Tripoli, seaport of the sand sea, there are more than 8,000 Jews. Most of the Israelitish women retain their Eastern costumes—their dark hair bound in bright silk kerchiefs; short, loose-sleeved bodices, and straight-hanging, striped silk skirts. They go barelegged, their feet thrust into heelless slippers.

A SOLDIER OF ITALIAN LIBYA

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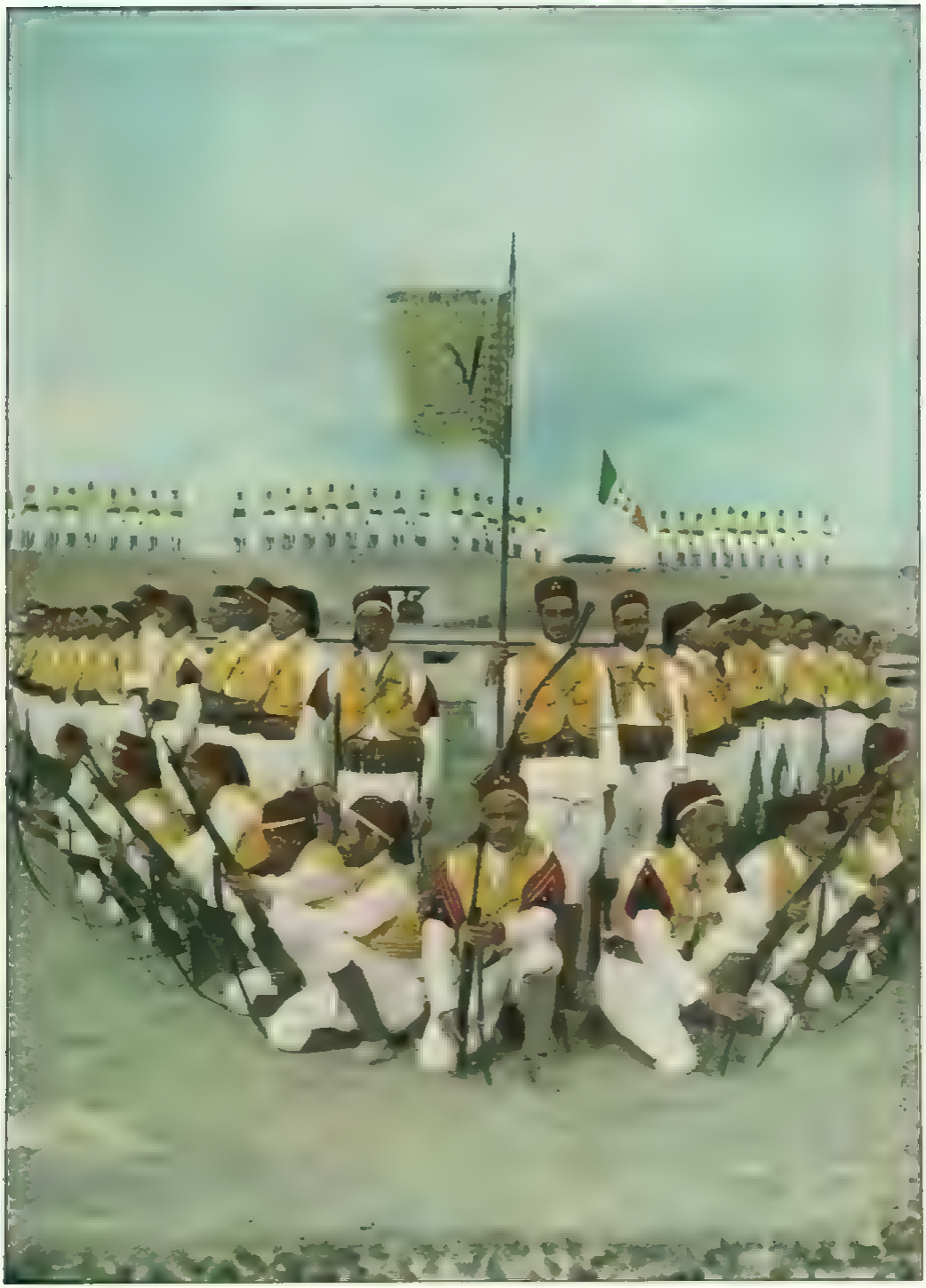
THE GOVERNOR'S BODYGUARD IN TRIPOLI

Once the home of the Barbary pirates, Tripolitania now relies upon the development of its pastoral and agricultural lands through the protection afforded by Spahi police.



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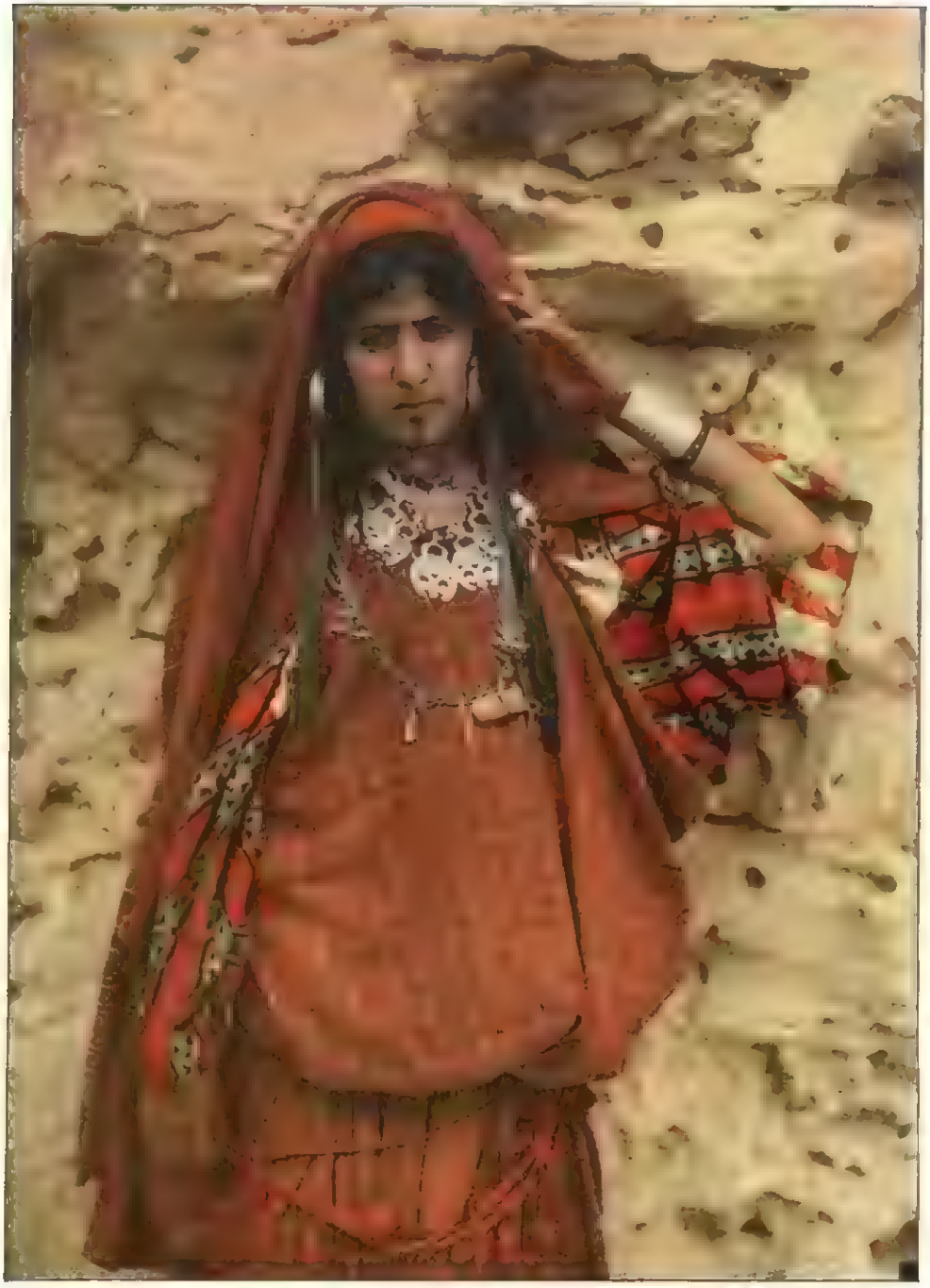
ONE OF ITALY'S BATTALIONS IN LIBYA

The mixed character of Tripolitania's population is reflected in the make-up of the native battalions. Berbers and Arabs, Negroes from the Sudan and Turkish descendants of the Janizaries have all left their impress on these colonial troops. The black-tasselled red fez and the broad woollen cummerbund (sash) of its particular regimental pattern—tartan, yellow, green, red, or blue — are picturesque features of the uniform of each *battaglione libico*.

© Autochrome Lumière by Luigi Pellerano

A MOHAMMEDAN PRIEST OF TRIPOLI

The Imam is a guide or leader of his people. He also conducts the Friday service of prayer and sometimes delivers a short sermon.



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A DAUGHTER OF THE LIBYAN DESERT

This Bedouin woman's brow, lower lip and chin are daintily tattooed. Her elaborate jewelry includes a commonplace key, a safety pin and a piece of a comb.

© Autochrome Lumière by Luigi Pellerano

A TOWN-BRED ARAB WOMAN: TRIPOLI

Such brocaded stuffs as would be out of place under the goat-hair tents of the nomads are worn by the Arab women of the town. Note, however, the tattooed cross on the forehead, which is also affected by the desert dweller (see Plate VII).

native troops has ended the menace of danger from the rebellious natives (see also text, pages 157 and 159).

TRIPOLI WAS A FAMOUS HAUNT OF PIRATES

The story of Tripoli goes back to the Phœnicians of Sidon, who founded it as a trading post, along with Sabrata and Lebda (called by the Romans Leptis Magna), the ruins of both of which are being excavated to-day (see page 161). It was formerly known as Oea, the name Tripoli being derived from "Three Cities" and first given to the whole territory, but gradually restricted to this one town.

Later a Carthaginian possession, Tripolitania passed, after the battle of Zama, in B. C. 202, to the Numidian Massinissa and his successors, and afterwards became a Roman province.

Near the harbor of Tripoli is an interesting Roman relic, an arch finished in the reign of Marcus Aurelius (p. 1351).

In turn the Vandals, the Byzantines, the Arabs in the seventh century; then the original inhabitants, the Berbers, and again the Arabs in the eleventh century, possessed the province.

In 1146 the Normans captured Tripoli, held it for 12 years, but lost it to the Moslems. The Spaniards occupied it from 1510 to 1530, when Charles V gave it to the Knights of Saint John of Jerusalem, later known as the Knights of Malta, who were expelled in 1551 by Turkish corsairs.

The Turks gradually extended their dominion over all Tripolitania. In 1714 one of their officers, Caramanli, by wholesale murder and by bribing the Sultan, made himself practically an independent sovereign. His dynasty occupied the very shaky throne until 1835, when the Turks seized the country again.

Long before Caramanli's day Tripoli had become infamous as a haunt of pirates. Like many other European rulers during the next two centuries, Oliver Cromwell sent a fleet, under Admiral Robert Blake, in 1655, to destroy the corsair ships and release the Christian slaves. The Dutch, the French, the English, the Americans, and the Sardinians, all in turn attacked Tripoli on account of piracy, which, however, was not finally ended until well into the nineteenth century.

In the war of 1911-1912 the Italians took Tripoli from the Turks and began the conquest of Libya, which, interrupted by the World War and the setback of the subsequent rebellion, is not yet completed in the eastern province, Cyrenaica, where they are still fighting hard against the Senussi. But the final issue is not in doubt.

In the western province, Tripolitania, the Italians have now established themselves firmly throughout the greater, or at least the most valuable, part. They hold solidly the line Ghadames, Sinaun, Nalut, Misda, Beni Clid, Bir el-Hasciadia, Bir el-Gheddahia, Buerat el-Hsun, Tsémed Hassan, and Kasr Zafran (Sirte) (see map, page 138).

Inside their zone are peace, justice, order, freedom, and coming prosperity. Outside it lie the stony desert of the Hammada el-Homra and the sands and oases of the Fezzan depression, where lawlessness still exists.

ITALIAN OFFICERS MAKE DIFFICULT TRIP OVER TRACKLESS DESERT

The few rebels who hold out are so scattered and dispirited that, even on this desert zone, outside the line of military posts, one may say that the Pax Italica rests. The daring automobile expedition from Tripoli to Ghadames, a distance of 366 miles, and back, undertaken in March, 1925, by a party of 12 Italian officers and soldiers, a photographer, and a journalist, was not disturbed, although they had no military escort, carried only nine rifles, and passed through the No Man's Land outside the zone policed by the troops.

The object of the journey was to find a route over the trackless desert by which wheeled vehicles could maintain communication between Tripoli and Ghadames, the oasis nearly on the border line between Tripolitania and the French Sahara, and the most southerly spot held by Italian troops.

The party traveled in one Ford and five Fiat automobiles, with ordinary tires and without caterpillar bands.

At one point the expedition encountered great dunes, some of them 600 feet high, with the result that it took *30 hours*

A BREAD MERCHANT AND BAKER OF TRIPOLI

One may buy his bread ready cooked or he may make the dough himself and take it to this shop to be baked (see text, page 137).

Photographs by Gordon Casserly

ISRAELITES IN AN ARABIC SETTING

The Jews of Tripoli are the business men of the city, and many of the trades are almost exclusively in their hands (see text, page 138).

Photograph by Gordon Casserly

TRIPOLITANIAN JEWS IN SABBATH ATTIRE

to go 500 yards, and only after nets had been put down could this formidable area be crossed.

CARAVANS ARE DESERTING GHADAMES

The oasis of Ghadames, which has an artesian well of warm water rich in medicinal mineral salts, was reputed to have 6,000 inhabitants a short time ago, but the caravans are deserting it and most of the trade now passes either via Agades and Lake Chad, in French territory, to the railway to Dakar, or toward Kano and the Nigerian Railway. The inhabitants, too, are gradually leaving it and only old men, women, and children remain. This deviation of the French Sudan commerce will mean a serious loss to Tripolitania.

The population of Tripolitania is estimated at about 550,000, a large proportion being nomad. Tripoli has 15,000 Italians, 2,000 Maltese, more than 8,000 Jews, and 32,000 Arabs, Negroes, and Kooloolies, or descendants of Turks and Arab women.

The coast line, from Cape Ras Ajir, on the Tunisian frontier, to Kasr el-Muktar, in the Gulf of Sidra, on the borders of Cyrenaica, is 660 miles in length. Except for the small gulf of Bu Kemesh (about 35 miles west of Suara), the low promontory on which Tripoli is built, and a few other very small features, it is unindented and devoid of natural harbors.

For the greater part of its length, especially in the west, the coast district, plentifully supplied with well water for irrigation purposes, has a chain of fertile oases of date palms, barley, fruit trees, and vegetables.

The Italians have built a railway from Tripoli for 74 miles along the coast to Suara, in the west; another to Tajura, 12 miles east of the capital, and a third line, due south for 31 miles, to Azizia. The last two are being continued, and the Tripolitanian Government is ready to extend the Suara Railway to the frontier of Tunisia, if the authorities of that protectorate will link with it the line from Gabes.

THE ITALIANS, LIKE THE ROMANS, BUILD FINE ROADS

Like their Roman ancestors, the Italians construct splendid roads, and, now that the rebellion has been stamped out, they are doing so in Tripolitania. One fine highway extends 75 miles east along the coast to and beyond Homs. Another

THE CHIEF OF TRIPOLI'S NEGRO COLONY

While all the races of the desert mingle freely in the streets and markets of Tripoli, the living quarters of each group constitute distinct communities, in the internal life of which native chiefs wield a definite and important influence.

Photographs by Gordon Casserly

TOO PROUD TO WALK

The workaday victoria is not usually associated with the Sahara Desert. Nevertheless, a number of the ebony ladies attending the festivals at the Negro mosque outside the city walls of Tripoli hire such vehicles to make the trip (see text, page 140).

HOLY BANNERS OF A NEGRO FESTIVAL

After the men have finished one of their ceremonial dances at the Negro mosque, the women form around the holy flags and two of their number pull the banners out of the sand and carry them off to the city (see text, page 140).

Photographs by Gordon Casserly

A NEGRO ORCHESTRA AT A RELIGIOUS FESTIVAL IN TRIPOLI

The dancing is usually accompanied by the thumping of large hand drums which suggest gigantic tambourines. To the rhythmic beat of these instruments the Negroes still perform the symbolic dances brought by their ancestors from the Sudan.

AN OASIS MARKET NEAR TRIPOLI

An interesting feature of the native markets is the butchers' section, where camel meat, beef, mutton, and goat are offered for sale. The butcher usually keeps his supply of meat "on the hoof," and the purchaser picks out his animal and has it killed and dressed before his eyes. When the butchers have dressed meat to display they often decorate it with gold paper or sprinkle it with black and white seeds to attract the attention of prospective customers.

Photograph from Frederick Howard Johnson

BEACH BEAUTIES OF TRIPOLI

Photograph by Gordon Cassely

A WANDERING MINSTREL OF LIBYA

Photograph by Gordon Casserly

THE NEW DEFENSIVE WALL OF TRIPOLI

Despite the fact that Italian soldiers have pacified a considerable part of Tripolitania, raids by bands of desert warriors are not beyond the realm of possibility and a strong new wall protects the town oasis.

Photograph from Frank Edward Johnson

PALM TREES ON THE EDGE OF THE SAHARA

The date palm provides the native of Tripolitania with one of his most valuable commercial products as well as with one of his staple articles of food.

Photograph by York and Son

A CANE HUT NEAR TRIPOLI

The Negro village in the oasis near Tripoli consists of a collection of conical huts, each surrounded by a brush fence. It suggests a bit of equatorial Africa transplanted to the shores of the Mediterranean.

goes south for the same distance to Gharyan and is being continued west to Yefren.

This latter route traverses the maritime plain and ascends into the Jebel, or mountain region. Outside the gates of Tripoli the country through which it passes consists of undulating dunes, generally covered with coarse vegetation, but in parts absolutely bare. To prevent the movement of the sand, the Agricultural Department is pinning it down with squares of stubble grass, inside which eucalyptus and other trees are being planted—a colossal undertaking.

The railway is approached and crossed several times, but the region looks unpeopled and is devoid of houses, the inhabitants being nomads.

At Azizia, however, where until 1919 the Turks and the Arab rebels had their headquarters, there is a fort on a small hill, a government dispensary for natives, a railway station, and some one-storied buildings. There are no troops, but a few European civilians reside there.

Beyond, the plain, having become more level, is covered with grass and, in the spring, with an astonishing profusion and variety of wild flowers. Without moving a foot from the spot on which I stood one day, I picked 12 totally different species.

Photograph by Gordon Casserly

A TRIPOLITANIAN CAMEL MARKET

Until the Italians occupied Tripolitania, railroads were practically non-existent in this part of North Africa, communication being almost entirely by camel caravan. Most of the country can still be reached in this way only.

A WANDERING SAND HILL IN THE LIBYAN DESERT

The border between Tripolitania and Tunisia is very uncertain south of Ghadames. It has been the subject of consideration for various international commissions, but great moving sand hills, which completely change the contour of the desert from time to time, make it difficult to maintain a fixed boundary.

Vast fields of barley planted by the nomad inhabitants stretch to the horizon on both sides of the road.

Hitherto, at frequent intervals, mounted patrols of the Carabinieri, that splendid force of Italians and Arabs, have been met with. Now, every few hundred yards an Arab sentry stands by the wayside, although, in the pacified state of the country, there seems little need of this precaution.

Presently the long line of hills—bleak, stratified, and precipitous—runs across the country east and west, and up its steep face, by sharp zigzags, climbs the road made by the Alpini in 1913, a splendid example of military engineering.

From the summit the traveler is amazed to find himself in a new world, a land reminiscent of fertile Sicily. Green fields of barley, corn, and vegetables, groves of magnificent olive trees—some perhaps dating back to the Romans—fig, pear, and other fruit trees cover the undulating tableland.

Here and there rise higher hills, and, in one place, the crater of an extinct volcano.

The soil is evidently good, but it is cultivated in a haphazard way. The mystery is, Where are the inhabitants who till it? Scarcely a human being is visible, and no villages or houses are to be seen along the way.

Photograph by Gordon Casserly

ITALIAN CIVIL AND MILITARY OFFICERS AT GHARYAN

Gharyan (Garian), in the Troglodyte country, is the center of a military and civil administrative district. Signs similar to the one in this picture, showing the distance to Mecca, are to be found all over the Moslem world (see text, page 160).

THE PIT HOMES OF THE TROGLODYTES

This, the territory of Gharyan, which has a population of 30,000, is the country of the Troglodytes,* the dwellers under the earth.

They do not live in caves, but dig in the level ground pits from 20 to 30 feet square and from 30 to 40 feet deep. To one side of each an inclined tunnel is burrowed down toward the bottom of the pit. Off the passage, at one or two levels, rooms are hollowed out, with openings for light and air, on to a face of the pit.

The ceilings and sides of the chambers and tunnels are damp with exuding moisture. A wooden door closes the entrance above, around which the excavated earth is spread in low mounds.

* See also "The Mole Men: An Account of the Troglodytes of Southern Tunisia," in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1911.

Photograph by Gordon Casserly

IN THE PIT OF A CAVE-DWELLING

A Troglodyte village is entirely underground. Holes are dug from 30 to 40 feet deep and of various sizes. Numerous caves dug in the sides of the holes serve as living rooms, storehouses, and stables. These strange dwellings are entered by means of a passage tunneled through diagonally from the surface of the ground to the bottom of the pit (see text, page 159).

This strange type of dwelling is cheap and easy to keep in repair, is cool in summer and warm in winter (see above).

As one proceeds along the road, a few buildings are seen at last, but they are evidently European. They constitute Gharyan, until November, 1922, the headquarters of a rebel chief. Now it is the center of a military and civil administrative district under a general and a civil commissioner.

The post consists of a fort at the edge of a precipice, on the site of a Roman castle; the beehive huts of a native infantry battalion; a few stone houses, the residences of the general, the commissioner, the officers, and the military club; a mosque, and the hospital, which once was the house of a rebel chief hanged for treason.

All around are the pits and yellow-clay heaps of the Troglodytes, but no above-ground village or habitations.

When at Gharyan I observed on a signpost upon which were tabulated in Italian and Arabic the names and distances of the neighboring stations, the inscription "To Mecca, 3,159 kilometers," a proof to the natives that the new masters of the land have no anti-Moslem prejudices (see page 159).

The district of Gharyan is from 1,800 to 2,100 feet above the sea, and its climate is good, resembling that of central Italy. Snow falls sometimes and there is generally an abundance of water for irrigation, from springs, wells, and cisterns. The inhabitants subsist largely on figs, of which they have 60,000 trees.

This district is a fair sample of the hilly region of Tripolitania and is suited to colonization.

EXCAVATION REVEALS WONDERS OF ANCIENT LEPTIS MAGNA

The coast road from Tripoli to Homs will soon be well known to tourists, for it leads to excavations that are now revealing the wonders of the buried city of Leptis Magna, at one time the most populous in Roman Africa. It runs parallel to the sea all the way, and for the first 12 miles passes through an astonishingly rich agricultural district, with many wells for irrigation, water from which is drawn up by bullocks, donkeys, and camels.

Two or three miles beyond Homs, a stretch of bare sand dunes lies between the road and the sea. One would not sus-

Wide World Photograph

A RARE FIND IN THE LONG BURIED ROMAN CITY OF LEPTIS MAGNA

This corner of a public bath, with mutilated statues of Apollo (left) and Aesculapius, the god of healing (right), has recently been rescued from Tripolitania's shifting sands (see text below).

pect that under these white mounds lies a city founded by the Phœnicians, which in the Christian Era gave a ruler to the Roman Empire.

But the spade is laying bare the ruins of Leptis Magna. Already the walls and arched gateway of the palace of its native son, the Emperor Septimius Severus, have been exposed after 1,200 years' burial. The admiring visitor may also see baths almost worthy of Rome, city gates and walls, a theater, precious marbles, a couple of streets, and part of a four-fronted triumphal arch.

From the dunes that have so long covered them are emerging the beautifully carved marble columns of the palace, erect and in position. Some are round, with artistic capitals; others are squared and chiseled with exquisite undercut designs of flowers, with the heads of animals inside, or with tiny groups of human figures wreathed with tendrils of vine branches. All are snow-white and nearly perfect.

Across the capitals of a line of pillars rests a long, rectangular marble block with the sharply cut words: "IMPERATOR C.ESAR AUGUSTUS LUCIUS SEPTIMIUS- —"

The thermæ, or baths, are even more surprising, for some of the walls stand 30 feet high. There are gigantic columns of colored marble and smaller white ones. Two marble-lined swimming baths, wonderfully preserved, still show the steps, the holes for the ingress and egress of water, and dressing rooms (see above).

All these wonders lay under 40 feet of sand. Down by the sea are the remains of the harbor mole, with the quay to which the galleys were made fast.

But the greatest treasure is a number of beautiful white marble statues and carvings as fresh as if made yesterday. A beautiful Venus is the gem of all.

Leptis Magna bids fair to rival Pompeii. But Tripolitania is daily revealing at Sabrata and elsewhere, other ruins of the trans-Mediterranean empire that the modern Romans are reviving.

Photograph by Dr. Henry W. Henshaw

THE BIRTHPLACE OF MOST CLOUDS

Evaporation, which furnishes the world's cloud materials, is a big drain on the seas; but water is fed back by rivers, glaciers, and showers to make good the loss. In all the world, it is estimated, more than 300 cubic miles of water fall as rain daily, or something like 16,000,000 tons each second. If Nature's laws were repealed and evaporation should cease, there would be a terrible demonstration of the priceless value of clouds. Every living thing of the land and air would be doomed, and all the earth except the sea would become a seared, desolate waste.

TOILERS OF THE SKY

Tenuous Clouds Perform the Mighty Task of Shaping the Earth and Sustaining Terrestrial Life

By McFall Kerbey

THE clouds of the sky may seem, like the lilies of the field, to toil not. But they do toil ceaselessly, and the record of their labors may be read in the mighty things they have done to and for the world.

Over and over again, in the millions of years they have been at work, they have carried all the oceans and have hurled them down upon the land—billions of cubic miles of water.

They have washed away mountains greater than the Himalayas.

They have filled up oceans as broad and deep as the Atlantic.

If we were to slice down through the crust of the earth for thousands of feet—a mile, five miles, in places, even ten—we would carve through cloud-built rocks, sediments laid down, grain upon grain, each carried by drops of water that have fallen from the skies.

The clouds have carved great valleys. The Grand Canyon is but one of their minor works, a labor of their yesterday.

They bore the feathery snowflakes which built up the huge glaciers that crushed and ground their way Equatorward during the Ice Ages.

They furnished the chief reagent for Nature's laboratory, dissolving and bringing together the minerals scattered through the rocks. The salt that savors our food, the clay that builds our houses, the iron that has made industrialism and the age of steel—to single out but three—are largely gifts of the clouds.

CHISELS OF THE SUN CARVE THE EARTH

Those are the labors of the past. But the clouds are working now as ceaselessly as they worked eons before man came upon the earth. Like the tools of the sculptor, these chisels of the sun, under the great mallet of gravity are steadily shaping the earth day by day.

They spend themselves to make the streams, to water the crops, to feed the world. But new cloud generations are ever coming on to take their places.

They are mists; yet they form one of the staunchest pillars of life itself.

The birth of a cloud is a puzzle to the observer. The sky is apparently clear; then suddenly, seemingly from nowhere, a cloud patch is floating aloft. Nature seems to be playing tricks, like a conjurer who draws kicking rabbits from an empty hat.

MOST CLOUDS BEGIN IN OCEANS

Clouds may start from any water that can evaporate—a tiny dewdrop on a rose; the family washing hanging on the line; a bead of perspiration on your brow; spray from the garden hose; steam from the family teakettle or a speeding locomotive; puddles left by yesterday's rain; little brooks and great rivers; lakes of every size, and the broad oceans.

Most clouds have their beginnings in the oceans, started by the restlessness of the inconceivably small and inconceivably numerous water molecules that have fought their adventurous way to these great basins.

In the form of water, these little molecules are relatively at rest, huddled close to their fellows, but fairly free to slip about in the crowd of water particles. As they are pressed together, they vibrate, as do all other molecules of matter.

In the delightfully ordered world of the water molecules there is more room at the top than anywhere else, and there the most active molecules—made more active by greater heat—make their way. Some jump or are pushed above the surface, wholly outside the crowd—tiny distances in truth, but very far in comparison to their size. If one could watch these jumping molecules with the eye of a microscope more powerful than any ever built, they might appear like flying

© Herbert G. Ponting

SUCH STUFF AS CLOUDS ARE MADE OF

Countless billions of billions of tiny molecules of water are constantly jumping out of the sea and into the air, through the process of evaporation, to form invisible water vapor. Normally the vapor that hangs over the sea is whisked away by the winds, still unseen, and is carried aloft by heat to build clouds. When the air near the sea becomes chilled, however, one of Nature's secrets is disclosed. The cloud stuff is seen floating off into the air just as steam rises, at a much higher temperature, from the boiling water in a teakettle.

Official Photograph, U. S. Army Air Service

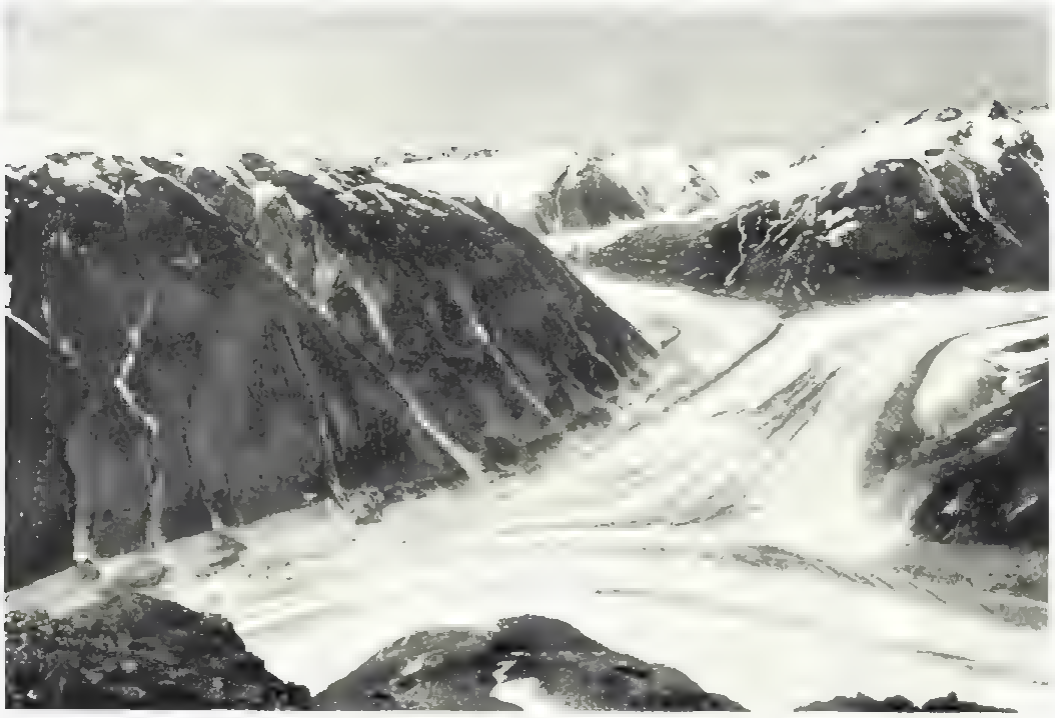
AN ANTEDILUVIAN MONSTER FLIES ABROAD

A little imagination can people the clouds with a vast horde of creatures never seen on land or sea, or crowd the sky with veritable castles in the air. Mountain ranges grow while you look; turreted walls tumble like those of Jericho; or a profile that puts a dozen "Great Stone Faces" to shame fills a whole quarter of the heavens.

Photograph by Jean Gaberell

NATURE IS NOT ABOVE COQUETRY

Just as a beautiful woman may enhance her charms by a veil that half conceals, half discloses, her loveliness, so Nature, casting a filmy scarf of cloud over her features, may lend to her peaks and crags a marvelous witchery. Fog shrouds the bases of these superb Swiss rock pinnacles and furnishes a feathery background for their lower profiles, while above float creamy masses of cloud that may be the seeds of later cumulus banks.



Photograph by O. M. Leland

AN ADAMANT CHILD OF GOSSAMER CLOUDS

Through their mighty progeny, the glaciers, clouds have dug huge furrows in the earth's hardest stones. They gouged out our Great Lakes, carved the beauties of Yosemite, and are ever plowing their way through countless mountain valleys. Like the ravens feeding Elijah, the feathery clouds bring to glaciers their daily ration of delicate snowflakes.

fishes darting from a tropical sea, or like toy balloons in a shop window set bounding up and down by air currents.

Like flying fishes, many of the molecules fall back into the water; but, unlike them, some can tear themselves entirely free. It is as if, magically, the fish became a bird. The escaped molecules are in a sense no longer water; they have become transformed by this process of evaporation into a vapor or gas.

Countless millions of billions of the molecules of nitrogen and oxygen, which for the most part make up the air, already occupy the space over the water, and the newcomers can advance into this crowd only by shouldering their way. So small and so numerous are the various molecules which make up the atmosphere that it has been estimated there are more than fifty billions of billions of them in a thimbleful.

The water vapor would eventually saturate the atmosphere if the latter remained entirely motionless, neither drifting aside nor rising, or if further changes in temperature did not occur.

But, like a busy switching locomotive, the wind usually moves blocks of air from the water when they still are only partly saturated and shifts drier air blocks in.

HEAT HOISTS CLOUD MATERIAL

Temperature is really the master cloud-builder. It makes the water molecules leap from the water, and it provides the energy of the interfering air molecules. So, too, it makes the winds that transport the vapor and mix it with dry air.

Only futile fog can be built close to the earth. If vapor molecules are ever to form rain-giving clouds, they must be raised aloft to the cloud regions; and, again, it is heat which takes them there.

The region of the atmosphere in which water vapor can exist in appreciable quantities towers some seven miles upward in the United States, higher in the

Photograph by William Reid

BOTH WATER, YET DIVERSE AS DAY AND NIGHT

Lunge upward as it may, the water of the sea cannot join the water of the sky save by passing through a veritable Valley of the Shadow. Chemically the molecules of water remain H_2O through its changes of form, but it must die as a physical liquid before it can become a ghostly gas. While the sea of the earth is heavy and dense, the sea of the skies is unbelievably diffused. Condense a houseful of average cloud and it would hardly fill the pitcher on your breakfast table. A block of cloud as large as a huge hotel would scarcely furnish a bath for one guest (see text, page 176). The clouds shown here are cumulus and strato-cumulus.

Tropics, and lower near the poles. The atmosphere itself, in a rarer and rarer form, reaches upward for many scores of leagues. But beyond a certain point no considerable amount of moisture can go, because it is squeezed out by cold. Beyond the dead-line, no clouds can form. It is wholly within this seven-mile region that water vapor fights its battles and performs its manifold services.

Vapor molecules are lighter than the oxygen and nitrogen molecules of the air. The vapor-laden air therefore rises for exactly the same reason that a balloon rises. The only differences are that Nature uses vapor (hydrogen and oxygen mixed) instead of pure hydrogen, works on a tremendous scale, and does not confine her light gas in a silken bag.

The warmer the air, the more vapor it can contain. If, on the other hand, warm air containing some vapor is cooled, its capacity for vapor diminishes. This decrease in vapor capacity takes place in a block of moist air as it rises into the cooler upper regions, and if it rises high

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SUN AND SEA HAVE CLOUD-BUILDING RIVALS

Not all clouds are composed of vapor alone. Volcanoes send seething masses of ash and smoke and steam upward like towering black cumuli. Even lightning bolts flash from these somber mimic clouds. In arid regions winds may sweep thousands of tons of sand and dust far into the air, building Nature's only "dry cloud." A forest fire or the burning of a great city builds clouds, part smoke, part vapor. And now man, with his smoke screen, builds clouds to order to hide his military, naval, and aëronautical operations.

Photograph by American Colony, Jerusalem

A COLOR HYMN OF LIGHT AND WATER

One might imagine the splendid colors and the great shafts of light and shadow in the sky at dawn and dusk to be Nature's ritual of beauty, through which sea and sky and earth glorify their great benefactor, the sun; for it is the sun that creates vapor, lifts it upward, and spreads it out in feathery cloud masses. The spectacle of sunrise and sunset is a sort of chromatic "Te Deum" of the cloud droplets, tinted by all the colors of the spectrum, before they start earthward as the rain that keeps alive all the plants and animals of the earth. The clouds shown above are fracto-cumuli.

enough to cool to the critical point, it simply drops part of its vapor load.

This is the real birth of a cloud. The invisible molecules of vapor that jumped out of the water crowd of the sea into the air must leave their gaseous form in the twinkling of an eye. They must become water. But their sea is far below and, divided into inconceivably small particles, they cannot solve the problem by diving back into it. The only solution is to create, far up in the air, infinitesimally small temporary "seas" of their own. Frantically they grab their nearest fellows and form tiny droplets that are hardly large enough to be seen.

As more and more droplets gather, they form a great misty mass thick and dense enough to obscure the sky.

MOST CLOUDS DO NOT RELEASE RAIN

There is a heavy mortality among the clouds, and rain is not always the immediate end of them. The pretty, fleecy

© Kolb Brothers

AN ELECTRICAL STORM AT NIGHT OVER THE GRAND CANYON

The vivid flashes of lightning and the thunder they create might lead the hypothetical man from Mars to believe that this demonstrative force of Nature dug the mighty chasm of the Colorado. But all the work was done by irresistible water. For long ages, clouds have discharged their burdens in the drainage basin of the river. Each cloud-born drop has taken its toll of silt grain or salt molecule and has gone its seaward way.

formations that lend an ever-varying beauty to the sky really make up the munition trains of the warrior clouds.

Nor is the water of the average cloud always passed on directly and simply to the rain clouds. It may pass through many forms, bound to a wheel of life in the skies for weeks before it finds at last the conditions that release it for its journey back toward the sea.

Temperature conditions may hold a cloud of extremely tiny droplets at the level where it was born, while winds blow it to drier regions or mix it with drier air which will evaporate it. The sun itself may heat it from above and cause its molecules to leap out of the droplets as they jumped out of the sea. Often in summer one may see tiny wisps of clouds dissolving in these ways into air.

EACH DROP MUST HAVE A NUCLEUS

When water-vapor particles condense into water droplets, whether on their rise from the sea or after numerous cloud-making adventures, they not only grasp their nearest fellow molecules, but they must find infinitesimal bits of floating

Photograph by Sumner W. Matteson

AN ACCIDENTAL BIT OF "COMPOSITION"

Graceful gulls outlined against a splendid sunset and gilded waters, caught by the camera. A great artist, able to paint in what his taste and imagination dictates, could hardly better this grouping of animate and inanimate beauty. In the background the sun is lighting up alto-stratus clouds which are thick and opaque toward the center, thin and translucent near the edges.

© Albert Schlechten

THE FOOD OF TO-MORROW FLOATS IN THE SKIES OF TO-DAY

The Solomons overlooked this proverb, but the science of meteorology is ready to write it. The world has its life-sustaining circulation of moisture much as the body has its essential circulation of blood. The water that rises from the sea as vapor, condenses as clouds, and falls as rain makes the world's crops for man and beast before it starts again for the skies, on another cycle. The clouds are an ever-redeemed promise of our daily bread. The smaller clouds near the horizon are fracto cumuli (broken cumuli); the formation near the upper edge of the photograph is cirro-stratus.

THE TORNADO CLOUD, TERROR OF THE SKIES

When a writhing black serpent of cloud forms, it means grave danger for those below. It is really a great suction tube that picks up trees and stones and man and most of his works as easily as a vacuum cleaner sucks up grains of dust and wisps of lint. Tornadoes have occurred in nearly every section of the United States. The one pictured passed close to the State Capitol of Texas, at Austin, a point farther south than the usual range of these destructive storms.

material, such as dust motes—a sort of magic carpet—and crowd upon them.

Dust usually is present abundantly, thanks to the winds and to volcanoes; and in the thickly peopled regions of the earth thousands of chimneys throw into the air in their smoke billions of potential cloud nuclei.

Even over the center of the greatest ocean there are as many as 750 dust particles in a thimbleful of air, and over the streets and buildings of large cities perhaps 200,000. In one cubic foot of air in any of our great cities there are twice as many dust motes as there are human inhabitants of the earth.

Widely separated, the dust motes, with their vapor passengers, at first float about like asteroids in space, but gradually the cold of the upper regions causes more and more of the vapor molecules to jump out of their gaseous form and attach themselves to existing droplets until the latter are built into drops heavy enough to fall earthward.

Sometimes the first drops of a thunder shower seem huge, as they flash past; but even the largest raindrops are relatively small. What is called popularly a "light rain," which just escapes being "drizzle," is made up of droplets only a trifle larger than the little black period that marks the end of this sentence. A "moderate rain" consists of drops with diameters only about twice that of the period, and the distance through a drop from a "heavy rain" is about that across four or five periods touching one another in a row. A rain classified as "excessive" has drops about the size of a capital "O" of THE GEOGRAPHIC'S type. When drops larger than the latter fall steadily, the downpour is called a cloudburst.

And they can be only a little larger at that. Nature, through the laws of physics, has set strict limits both upon the size of raindrops and upon the speed at which they can fall; and the drop that attempts to pass either limit is promptly blown to pieces.

Photograph by Dr. Henry W. Henshaw

A PARADOX OF POWER

Strangely, man has never been able to harness the crashing waves of the sea; but the seemingly impotent clouds are reservoirs of energy that he taps continually. The scattered raindrops that clouds release, herded by gravity into rills and streams, turn man's water wheels as they scramble back toward the sea. Clouds, perhaps, are lighting your home, cleaning your floor, and boiling your morning coffee. The illustration shows a bank of cumulus clouds (see also cloud chart, page 187).

The largest raindrops that strike the earth have diameters about equal to the diameter of the average lead pencil.

The greatest speed at which a raindrop may strike the earth, no matter from how great a height it falls, is close to 30 feet a second—a speed less than that of a pebble dropped from a fourth-story window.

THE MOLECULES IN YOUR GLASS OF WATER

In the average cloud that floats on an overcast but rainless day—a cloud such as those that bear most of the world's water from the sea—there are not more than two tablespoonfuls of water in cloud enough to fill the biggest furniture van; and, unless you live in a mansion, your dining room could not hold half the cloud substance that Nature has crammed into one glass of water on your breakfast table.

Try to count the invisible molecules that jumped out of the sea and traveled perhaps hundreds of miles that you may have your morning quaff. You will bankrupt arithmetic at the start, for it

Photograph by M. Rosenfeld

NATURE'S MASTERPIECE OF THE SKIES, THE SUNBURST

When great floods of sunbeams pour out through tattered clouds, marking long radial lines of shadow and light, tinting their paths with varied colors, an unsurpassed spectacle is created. The cloud mass shown is nimbus.

has been estimated that in a third of a thimbleful—a cubic centimeter—of water there are probably more than 32 trillions of billions of molecules, and in an ordinary glass of water there are 240 times as many!

A HOTELFUL OF CLOUD FOR EACH BATH

Consider your daily cloud consumption further. Your morning bath, in terms of the cloud that carried it, is probably more than 165 feet long and broad and deep If you take it in a fifteen-story hotel covering a quarter of a city block, the building would barely hold enough cloud to give you a tub of water.

The water-supply system of a great city eats clouds by the skyful. New York City must have more than 730 million gallons of water a day and has provided hundreds of square miles of watershed to catch the necessary rain.

Picture the daily cloud quota for the city's water supply rolling up to discharge its burden, if all the water had to fall directly on Manhattan Island. The cloud

Photograph by Edgar A. Cohen

FOG PROVES THAT DISTANCE LENDS ENCHANTMENT

The earth-bound spirit of cloudland, fog, does not differ much from other cloud forms, save in position. Raise this clammy, depressing mass of vapor into the sky and let the sunbeams play about its edges, and it becomes a thing of beauty. Or climb above it and it appears an ocean of billowy foam. The photograph shows a sunset over the fog from Mt. Tamalpais, California. Note the corona about the sun.

bank would stand over the island more than 30 miles deep every morning and could hardly all turn to rain before the next 30-mile supply would come floating up to take its place.

MAN HARNESSES THE CLOUDS

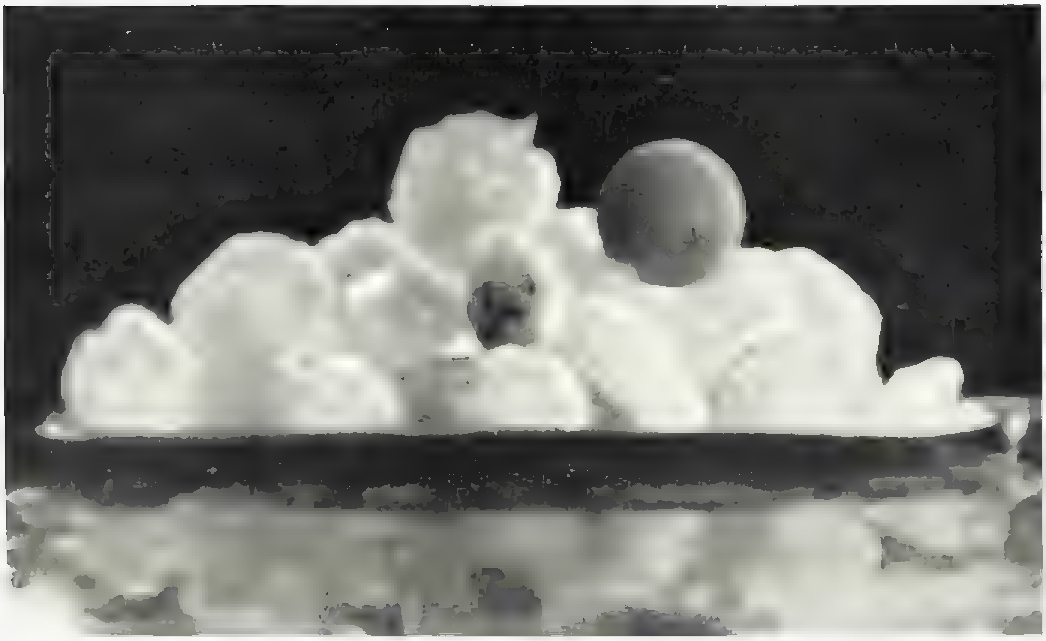
Clouds are power for man as well as for Nature. The clean white scrap of mist floating in the sky and the grimy, black lump of coal far under ground are brothers under their skins—both children of the sun. One, born millions of years ago and locked deep in the earth, must be toilfully dug out and brought to the surface before it will yield the power it holds. The other, born yesterday, will presently mine itself; and if its fragments are merely guided on their dash to the sea, they seem eager to turn man's machinery.

Man cannot tow his loads of sky coal where he will. Nature sends them along definite highways and dumps them with fair regularity in her chosen places. For ages man used them only near where they fell or along the channels they wore in their slide seaward; but now he has in effect scattered the clouds. He has learned to transmute the down-hill wanderlust of their fragments into invisible but potent streams of electrons that will course along wires far from the old limiting channels. And now, though you live in a desert where you seldom see a cloud, you may have those of more favored lands for your servants. Press a button and they light your house, boil your coffee, and perhaps even curl your hair.

WHERE CLOUDS CONGREGATE

Fortunate it is that that portion of the sea which hangs ever in the air is scattered; for if all the clouds should gather and dump their burdens, now over one limited area, now over another, man and his works and most vegetation would be uprooted and swept from the face of the earth.

It is no less fortunate that rivers and



Photograph from Dr. S. Francis Howard

WHEN SKY BATTERIES BOMBARD THE EARTH—"HAILSTONES AS LARGE AS TENNIS BALLS" (TENNIS BALL AT UPPER RIGHT)

These huge hailstones fell at Pretoria, South Africa, Christmas evening (summer in the southern hemisphere), 1923. Raindrops are held within rigid limits. They cannot grow larger than the rubber eraser on the end of the average pencil, for air resistance blows them to pieces (see text, page 174). But hailstones can form as large as oranges—missiles that fall with the speed of cannon balls and which may wreck roofs, destroy crops, and kill man and beast. Hail is believed to be produced by upward gusts of air that carry raindrops into cold regions. The ice pellets may sink to the rain levels again and again, where they gather additional water, which in turn is frozen. Such a manner of growth is indicated by the onionlike structure consisting of concentric layers of ice. On the other hand, sleet, made up of tiny ice pellets, is formed by the freezing of little raindrops as they pass through cold air on their fall earthward. Conditions for the formation of sleet are usually present only in winter.

glaciers and clouds are pouring water into the seas almost exactly as fast as it is being taken out by the sun. If in some way the amount which now evaporates daily were pocketed in a Gargantuan cave or flung away into space, the oceans would last less than 2,700 years.

Though, mercifully, clouds are fairly well scattered over the earth, they have both favorite haunts and places which they shun, and they mark the regions where they gather as obviously as a cartographer colors his maps. The greens of fields and meadows, forests and jungles show in crescendo their favor, and the buffs of steppes and the browns of lifeless deserts mark the places they rarely visit or pass wholly by.

The favorite gathering place of clouds in all the world is the southern slope of the Himalayas, and the track of the monsoon which blows the loaded water-carriers there from the Indian Ocean is their most congested roadway. The spot that seems above all others to attract them is the region about a little village in Assam—Cherrapunji, between the Bay of Bengal and the Himalaya foothills.

More than 38 feet (458 inches) of rain falls there in an average year, and in exceptional years more than 75 feet (905 inches) has fallen. This latter amount would be enough, if it fell in a city and accumulated without loss, to reach by the end of the year to the sixth or seventh floor of an ordinary office building.

Over a smaller area Cherrapunji's average annual rainfall is even exceeded in the Hawaiian Islands, where on the top of Mount Waialeale, Kauai, nearly 40 feet of rain falls each year.

On down into Burma, into the narrow peninsula of the Straits Settlements, and the East Indies, astride the Equator, ex-

© Herbert G. Ponting

A HOOD OR CAP CLOUD TOPPING FUJIYAMA

This is one of several special mountain clouds, the most striking of which is the true banner cloud. The latter forms in a stiff wind which blows moisture-laden air past the peak. As the moisture enters the windward margin of the cloud, it condenses and becomes visible; as it leaves the leeward edge, it again sinks into invisibility. The particles of cloud, therefore, are in rapid motion, but the form remains fixed.

tends the greatest cloud and rain belt of the world.

The next greatest gathering place and dumping ground of the clouds is in the western tropical portion of Brazil, where the Andes reach up and squeeze out the moisture into the tributaries of the world's greatest river, the Amazon.

Only in two other places do the clouds crowd together and give down their moisture in such measure as to be at all comparable to India and Brazil—on the southwestern coast of Africa's great bulge into the Atlantic and not far away under that continental eve where the coastline of Africa strikes southward again.

Well outside the Tropics the greatest concentration of rainclouds in the world occurs in North America, along the southern "kite tail" of Alaska, though far to the south a narrow strip of southern Chile has almost comparable conditions.

On down into our northwestern States the cloud concentration extends in somewhat less degree.

POWER POSSIBILITIES SHOW CLOUD GENEROSITY

Power possibilities clearly tell the story of the generosity of the clouds in this region. To visualize the extent of their contributions, one needs only to know that the State of Washington leads all other commonwealths in potential water power, and that nearly one-third the total

for the whole United States lies in Washington, Oregon, and Idaho.

Already much of this power is in use. Clouds, if you will, to-day pull long, heavy freight trains over the northern Rockies, light the streets of scores of cities, and pump the water that is rescuing from the grip of the desert wide stretches of land which the selfsame clouds decreed should be arid.

If fog be classed as cloud, there are regions of the earth where clouds blot out a sight of the sky for a large part of the year. A fog blanket closes down in the autumn on the tiny island of St. Kilda, west of northern Scotland, and is practically unbroken until early summer. On and near the Grand Banks of Newfoundland fogs occur often in spring and summer, blotting out sky and sea alike.

On the other side of the picture are the world's cloudless regions. The people of the desert coasts of Peru may go for years without the sight of a cloud.

Over parts of the Sahara and Gobi deserts and in the arid region that was German Southwest Africa clouds are scarce. In our own Southwest, near the mouth of the Colorado River, only five out of every hundred days are cloudy. So unusual is cloudiness in Yuma, Arizona, that one hotel there has made itself and its city famous by offering "Free board every day the sun doesn't shine."

NATURE TUCKS CLOUD BLANKETS ABOUT US

Clouds and cloud-stuff perform services not directly connected with the carrying of water and the creation of power.

Both in the form of water droplets, whose masses appear so dense, and as invisible vapor in a seemingly clear sky, they serve as screens by day to temper the sun, whose unrestricted rays, beating constantly on the earth, would parch and sear much that to-day is green and flourishing.

By night these same clouds and vapor particles are like an ample blanket tucked about the sleeping half of the world, keeping in the heat.

In grace of form, in light and shadow, in the contrast that deepens the blue of the sky, and in the varied hues captured from the sunbeams, clouds give to the world a beauty that could ill be spared.

They build real castles in the air: pleasure domes, pinnacled cathedrals that spring up while you look, as if Abt Vogler's demon builders and all the gods of wind and water were rushing them into shape.

On the horizon may grow, while you look, veritable mountains of cloud. Nearer may be a Sphinx, its features measured by miles, or a Colossus whose legs could bridge a wide bay as easily as their bronze patterns were reputed to span a narrow harbor's mouth.

While one watches, Icarus flies again, and, as of old, the wax of his fleecy wings melts in the sun's warm rays. A great ship sails into view, spray dashing, and in another quarter of the sky myriads of fleecy white sheep browse in an azure meadow.

SCIENCE EXTRACTS THE ROMANCE

Science puts it otherwise. The mountains and the Sphinx and the Colossus are cumulus banks, thunder heads, breeders of storms and lightning bolts (see pages 187 and 188). Icarus is but a fragment of cirrus cloud (see pages 181 and 182); the ship is a fracto-cumulus (see pages 170 and 173), and the browsing sheep are only some thousands of alto-cumuli (see pages 184 and 185).

There are three major types of clouds: cirrus, cumulus, and stratus; and all the numerous usual forms are combinations of these three (see cloud chart, pages 181 to 188).

Fogs form only because the wind has failed to play its part in cloud-building. If moist air continues to lie just above the earth or water, or drifts gently along without being pushed upward, it may cool to the condensing point. The upper reach of fogs is seldom more than 300 to 600 feet.

FLYING MAKES CLOUD LEVELS IMPORTANT

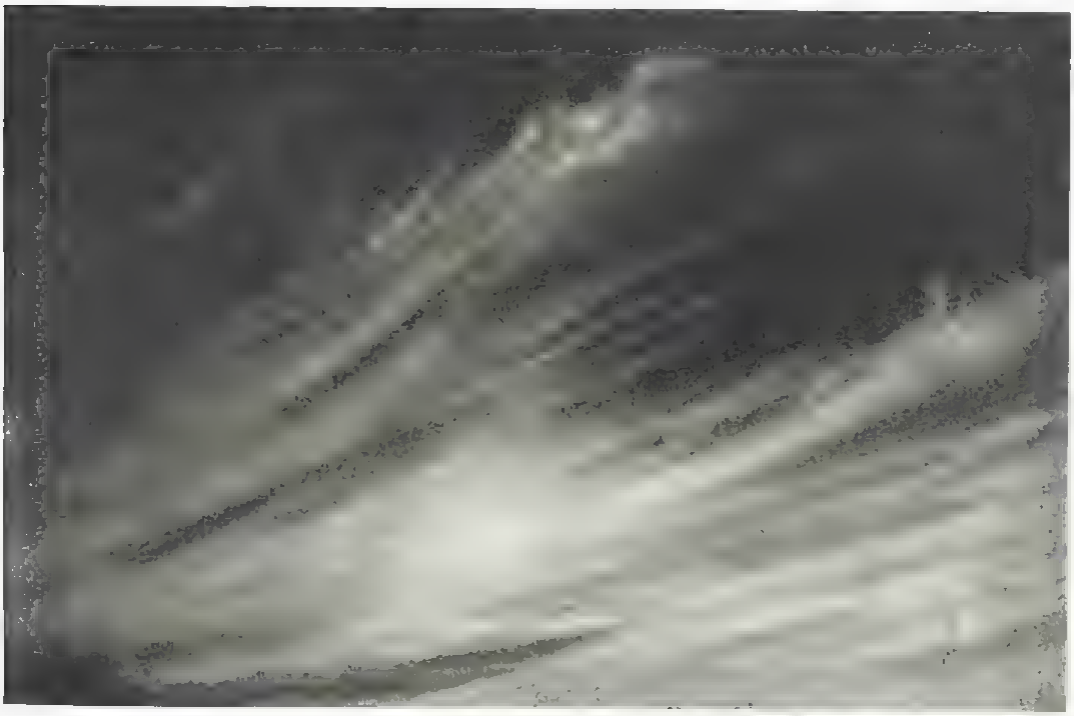
Clouds do not fly in a haphazard way in the sky. Certain types float in fairly definite zones, and are seldom found elsewhere; and between these cloud levels are cloudless zones, through which moisture usually passes in its invisible state to form clouds only when it reaches a "friendly" level.

These levels vary somewhat, and great storm clouds may ignore them and plunge

Photograph by F. Ellerman

TUFTED CIRRUS

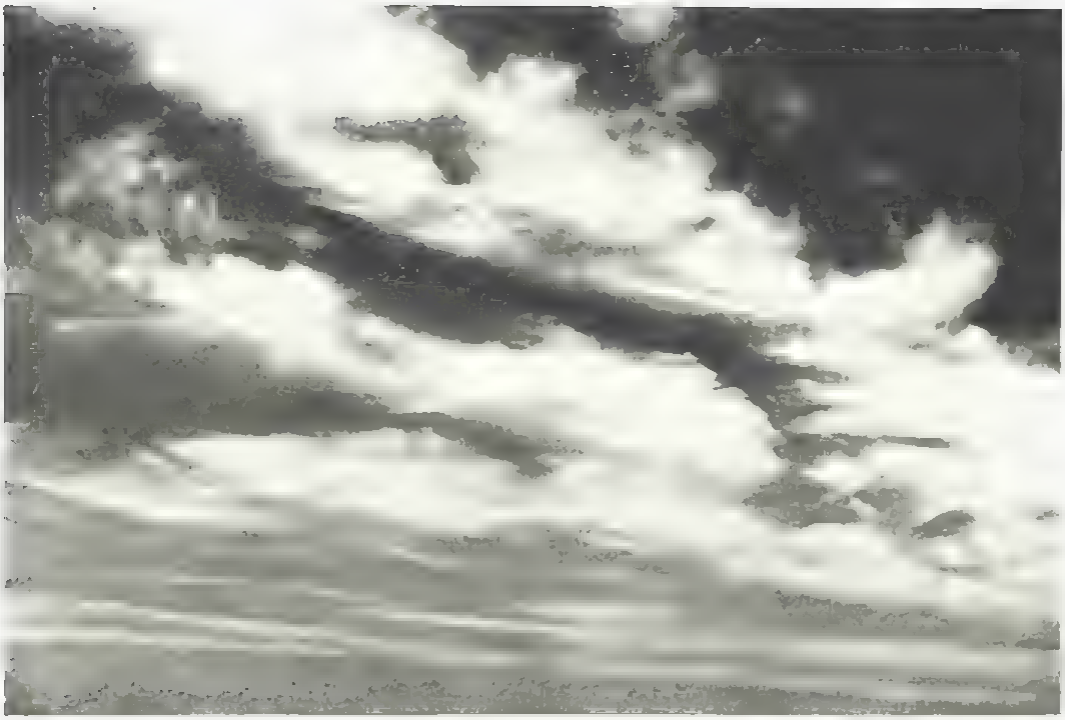
These dainty and exquisite wisps of cloud are the most ethereal of the vapor creations of the sky. This and the following fifteen plates are from photographs selected by the United States Weather Bureau to represent the types of clouds indicated.



Photograph by A. J. Weed

CIRRUS: A FIBROUS FORM

Whether it shows itself as faint wisps, long fibers, or dense bunches, cirrus has a characteristic delicacy, especially about the edges, which makes its identification relatively easy. This is because cirrus is almost always a frozen cloud, made up of tiny ice spicules and prisms—fairy needles so fine that only Titania, in a domestic mood, might wield them.



Photograph by Ebro Observatory

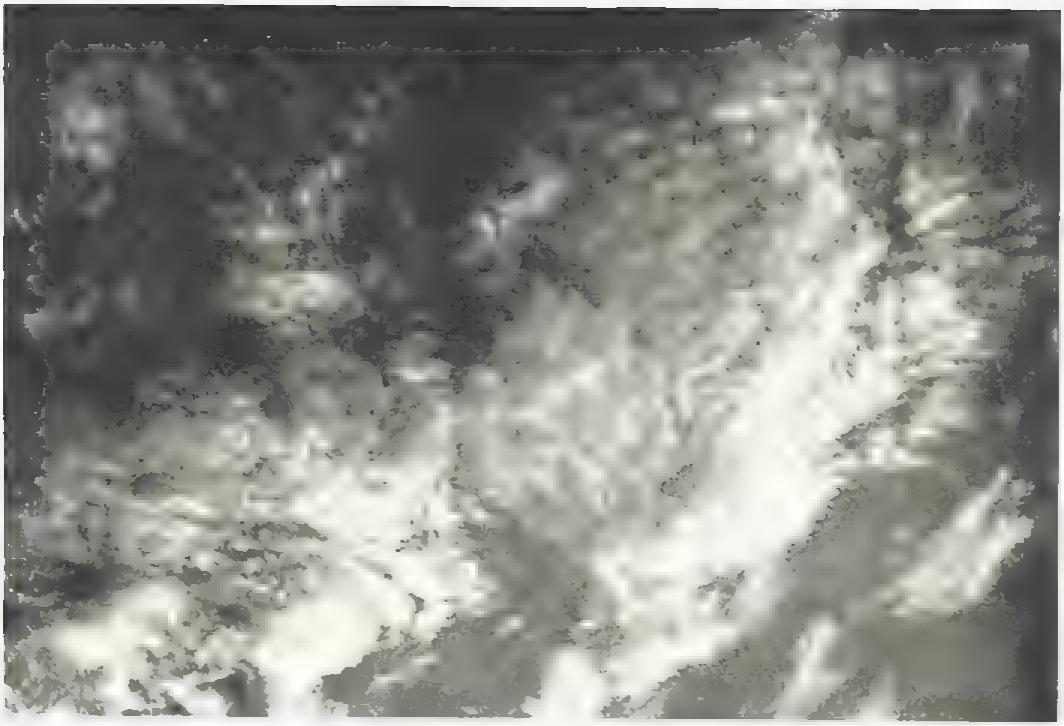
CIRRUS: A BUNCHED FORM

This type is somewhat denser than those shown in the two preceding plates (page 181). Cirrus clouds are described in the International Cloud Atlas as "detached clouds of delicate and fibrous appearance, often showing a featherlike structure, generally of a whitish color."

Photograph by A. J. Henry

CIRRO-STRATUS

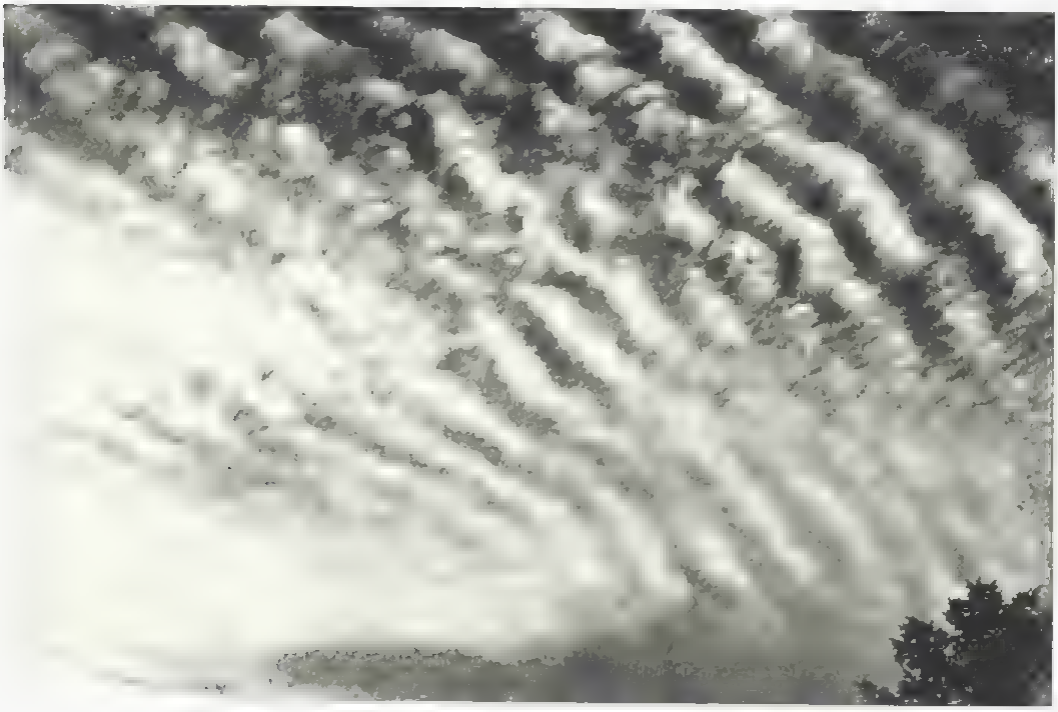
The form shown in the lower part of this illustration is cirro-stratus. The upper portion shows bits of cirrus. The cirro-stratus sheet often produces halos—well-defined narrow circles of light surrounding the sun or moon and *at a distance from it*. They are to be distinguished from coronas, which appear to touch the source of light (see page 177).



Photograph by F. Ellerman

CIRRO-CUMULUS

The official definition of this form is: "Small globular masses or white flakes without shadows, or showing very slight shadows, arranged in groups and often in lines." Cirro-cumuli are nearly always frozen, as are the other members of the cirrus family.



Photograph from U. S. Weather Bureau

CIRRO-CUMULUS: WAVED FORM

This, one of the lowest of the frozen clouds, floats from a mile to three miles higher than Pikes Peak. The beautiful waved structure is not a characteristic of cirro-cumulus alone; it is seen in practically all the thin clouds, from strato-cumulus up to cirrus. It is formed by air currents flowing past one another at different speeds, thus setting up waves.

Photograph by Ebro Observatory

ALTO-STRATUS (LOWER PART OF ILLUSTRATION)

This form consists of "a thick sheet of gray or bluish color, sometimes forming a compact mass of dark-gray color and fibrous structure. At other times the sheet is thin, resembling thick cirro-stratus (see page 182), and through it the sun or the moon may be seen dimly gleaming, as through ground glass."

Photograph by A. J. Weed

ALTO-CUMULUS: SOMEWHAT RAGGED

Alto-cumulus clouds are "largish globular masses, white or grayish, partly shaded, arranged in groups or lines, and often so closely packed that their edges appear confused. The detached masses are generally larger and more compact at the center of the group, but the thickness of the layer varies."

Photograph by A. J. Henry

ALTO-CUMULUS: UNDULATED TYPE

Alto-cumuli are the highest of the cumulus family. They usually gather some two miles up, in great crowds of small and medium-sized patches, partly shadowed, partly gleaming white, and produce some of the most striking of the cloud effects. It is they that form the prettiest "dappled skies." Shadows usually serve to distinguish small alto-cumuli from cirro-cumuli.

Photograph by W. S. Davis

STRATO-CUMULUS

"Large globular masses or rolls of dark cloud, often covering the whole sky, especially in winter. Generally strato-cumulus presents the appearance of a gray layer irregularly broken up into masses, of which the edge is often formed of smaller masses (see upper part of lower illustration, page 186), often of wavy appearance, resembling alto-cumulus."

Photograph by F. Ellerman

STRATO-CUMULUS

This photograph, taken from an airplane, shows a characteristic strato-cumulus effect in the lower portion, where the closely compacted fragments cover nearly the whole sky. Part of this effect is, no doubt, due to perspective. The form shown in the upper portion of the illustration is that of alto-cumulus (see lower illustration, page 184).

Photograph by Ebro Observatory

STRATO-CUMULUS

When strato-cumulus rolls such as those shown on the preceding page break up with a change of weather, the ragged form shown in the lower part of this illustration often results. Very striking sunset effects are brought about by an illuminated sky behind these broken strato-cumulus rolls. Such clouds usually fly from one-fourth to one and one-fourth miles above the earth.

Photograph by W. M. Lyon

CUMULUS

"Thick clouds of which the upper surface is dome-shaped and exhibits protuberances while the base is horizontal." Patches of cumulus such as these, seen after noon, usually indicate the continuation of fair weather at least for the remainder of the day and night. If observed in the forenoon they frequently grow into cumulo-nimbus (see page 188) later in the day.

Photograph by C. A. Gilchrist

CUMULUS ROLLS

Such clouds, when they mark the front of an arriving wedge of cool air, may develop thunderstorms locally. Cumuli with contrasting shadows and patches of gleaming white are easily photographed. Not so the sheet clouds, such as nimbus, which are especially difficult to record photographically. This latter is "a thick layer of dark clouds without shape and with ragged edges, from which steady rain or snow usually falls."

Photograph by A. J. Weed

CUMULO-NIMBUS, OR THUNDER CLOUD

"Heavy masses of cloud rising in the form of mountains, turrets, or anvils, generally surmounted by a sheet or screen of fibrous appearance (false cirrus), and having at its base a mass of cloud similar to nimbus. From the base local showers of rain (occasionally of hail or soft hail) usually fall." Cumulo-nimbus often reaches the very roof of the cloud world, seven miles or more up. It is from these clouds that lightning flashes.

Photograph by A. J. Weed

STRATUS

This is "a uniform layer of cloud resembling a fog, but not resting on the ground. When this sheet is broken up into irregular shreds in a wind, or by summits of mountains, it may be distinguished by the name of fracto-stratus." (Fracto-stratus forms are seen against the brilliant portion of the sky in the above illustration.)

through unbroken to a depth of seven miles; but in the sky, from day to day, the normal clouds ordinarily keep to their levels.

This cloud ladder of the sky, with its alternate spaces and rungs, has not been a matter of practical importance to man in the past; but now that he travels by airplane and dirigible the location of the clear spaces is of very great importance.

THE TERROR-INSPIRING TORNADO CLOUD

The only really terrifying cloud is that of the tornado. Dropping its great swirling black tail from a blanket of nimbus clouds (see page 174), it seems to be lashing the earth like some gigantic, infuriated dinosaur.

The tail is really cloud stuff and dust swirling around a suction tube that draws up everything in its path with an almost irresistible force — a Titanic vacuum cleaner. The rotary motion is given when streams of warm air rush from several sides to take the place of that which is rising. Once this swirling chimney of air forms it may persist for long periods.

It is at dawn and at sunset that Nature spreads her pigments among the clouds with a lavish hand. The happy coöperation of three of Nature's tiniest things makes a sunset sky a blaze of glory or a delicate pastel study whose perfection no painter can approach.

The infinitesimally short waves of sunlight would pour down merely as white light but for the diminutive dust motes that get in the way and sift out the component colors, from violet to red. And even when the colors are brought into existence they would stream on through the atmosphere and into space, if the all but invisible water droplets did not huddle together into clouds to capture them and hold them for the world to see.

The more dust, the more sumptuously the clouds are bathed in rose and gold and fiery red. The occasional storms that raise tons of dust into the sky of our own dry Southwest sometimes seem a trying cross for its people to bear. But there is a wonderful compensation. High in the air the tiniest dust grains atone for the sins of their coarser fellows. Nowhere else in the United States do the skies burst into such a glory of color at dawn and sunset, nor does the approach of twilight cast such magical, soft-hued shadows that can transform bare, rugged mountains into fairylands.

Not all the most striking spectacles of sunset skies depend on color. In even the most gorgeously colored sky the shadows play an important rôle, and when the sun breaks through a tattered cloud, sending out great radial streams of light to plow through dusty and cloud-strewn air, it has created the masterpiece of sunsets, the sunburst.

THE RAINBOW, WHERE SCIENCES AND ARTS LIE HIDDEN

Of all the beautiful forms that clouds have brought to the world, the rainbow is undoubtedly that which has most stirred men's imaginations. For ages before geometry was known or the arch used in architecture, Nature flung across the sky this great geometric design, a pattern for future domes and portals.

The rainbow that one sees results from rays of light that are bent and in addition almost always reflected, by passing into and out of drops of water in the air. There are a number of possible rainbows having different positions, but the primary bow is seen much more often and more clearly than any other. This bow is always seen as the observer looks away from the sun.

A fascinating fact about the rainbow is that the bow to which you direct the attention of a friend is not the one he sees—your rainbow is yours and yours only.

And the falling raindrops are as colorless as the water in your drinking glass until they arrive at a certain line in the sky; then they flash forth their blaze of color for a fraction of a second and resume their colorless paths—colorless, that is, for your eye. But their pencils of colored light may be falling on another eye and creating a bow for it.

A rainbow, then, is not a material thing like a cloud or a tree. It is really a phantom of the skies, almost as evanescent as the apparent circle one draws in the air with a whirling torch.

The rainbow is a token, we are told, that man shall not perish by water. But every cloud that floats, though it be drab and unlovely, is a pledge that man shall have water to save him from perishing.

Clouds are, in truth, the ever-redeemed promises of our daily bread.

Photograph by A. Kerim

DESERT POLICE ON PARADE

The law officer (in the foreground) of the new Arab Kingdom of Iraq (Mesopotamia) is carrying his tribal banner. On their motor journey from London to Quetta, Major F. A. C. Forbes-Leith and his two companions passed through the desert region patrolled by these camel-mounted police (see text, page 220).

FROM ENGLAND TO INDIA BY AUTOMOBILE

An 8,527-mile Trip Through Ten Countries, from London to Quetta, Requires Five and a Half Months

By Major F. A. C. Forbes-Leith

EARLY last year I decided to make an attempt to drive a motor-car from England to India, a journey which necessitated passing through ten countries and across two continents.

Airplanes had already flown to India on several occasions, airships for a regular mail service were in the course of construction, even one of the submarines of our Royal Navy was on its way, but as yet no effort had been made to bridge the distance by mechanical wheeled transport.

At least two-thirds of the journey would have to be made in Asia, through little-civilized country that could not be depended upon for car maintenance, so the method by which we should make the attempt was a matter for serious thought.

If we carried every spare part that might be required, and also a complete outfit of clothing necessary for the use of several men traveling through Europe and Asia, at least four cars would be needed. But in the event of the complete breakdown of one or more cars, the others would have to bear the burden of the extra personnel and equipment, thus creating many difficulties.

I decided to make the effort with a single car.

Then arose the difficulty of finding a suitable car, for it would have to be of stout build, and yet be light enough to man-handle often; powerful enough to climb almost any gradient with a heavy load, and yet of sufficiently low horse-power to be economical in petrol consumption. My choice eventually fell on a 14-horsepower Wolseley, fitted with an ordinary touring body which, with the exception of extra tankage, was in every way a standard pattern.

EXTRA EQUIPMENT FORWARDED IN ADVANCE

Personnel was the next difficulty. Finally I chose as diarist Mr. Allan Wroe, of Leeds, and by arrangement with Pathé Frères, Mr. Montague Redknap was allotted to me to make a travel film.

Dumps of tires, spare parts, and film were sent ahead to Belgrade, Constantinople, Alexandretta, and Bagdad, but, in the car we carried nothing more than the ordinary motorist would take with him on a journey of 100 miles.

Personal baggage was limited to 35 pounds per man, and camera, film, emergency rations, spare parts, tools, two spare tubes and tires, and our three selves, weighed about 1,200 pounds. This, with a car weight of 2,500 pounds, made a total load of just under two tons.

We did not realize that our modest effort would interest the public but, a few days before we started, we were supported with enthusiasm by the press. The Lord Mayor of Leeds gave us a civic farewell, and, on passing through London, a large crowd assembled in Piccadilly Circus, that hub of London's gayer life.*

After a farewell lunch in London we left for Folkestone, and took the ferry across the 26 miles of sea that separate Great Britain from the continent.

CARTOON CAT THE EXPEDITION'S MASCOT

We adopted as our mascot, "Felix," the famous cat, and named the little car that was to be our home for five and a half months "Felix the Second."

What a lucky mascot he was, and what a laughter-maker he proved to be! Many times when we found a cordon of stern-faced customs officers awaiting us at a frontier, the sight of Felix, sitting grinning on our spare wheel, made them smile and softened their hearts toward us.

When we landed in France a tremendous change in conditions was immediately obvious. Humanity was working

* See also "London," in the National Geographic Magazine for September, 1915.

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PICCADILLY CIRCUS, WHERE LONDON SAID GOOD-BY TO THE AUTOMOBILISTS

A large crowd assembled in this hub of the British metropolis to wish the author and his companions success on their motor-car journey across two continents.

under full pressure, and we were told that on that day there were only 16 registered unemployed men in the city of Paris. Hardly a square yard of soil could be seen that was not under cultivation. Men, women, and children, in quaint costumes and large wooden shoes, were planting, plowing, or gathering in every field.

Although we were passing through the war area on our southward run to Paris, not a trace of destruction could be seen. An atmosphere of prosperity and peace existed everywhere.

The British taxi driver has a bad reputation, but after driving through the streets of Paris among French taxicabs, I came to the conclusion that he was worthy of a halo. The French driver of a cab drives like a juggernaut. Everything must give way to him, and his *laissez passer* is his siren; when that is blowing he stops for nothing.

Here we had the first of our two punctures, unfortunately picking up a horseshoe plus the nails. However, a horseshoe is supposed to bring good luck, and in this minor misfortune we certainly acquired an extraordinary degree of immunity from trouble later on.

In Paris we met the famous film actor, Mr. Douglas Fairbanks, who gave us a send-off and whispered to Felix to "Keep

Drawn by A. H. Bumstead

A MAP SHOWING THE AUTHOR'S AUTOMOBILE ROUTE FROM ENGLAND TO INDIA

on purring." Thenceforth we adopted as our slogan, "Felix keeps on purring."

The French are a delightful people, and it is a pity that both the British and Americans do not make a greater effort to understand them. Naturally, as a Latin race, their temperament is entirely different from ours.* Nevertheless, the effort to understand and fraternize comes more from the Frenchman than from ourselves.

STOPPING IN AN INN ONCE OCCUPIED BY NAPOLEON

Our first stop after leaving the gay city was at Briare, a delightful little village 70 miles to the south. Our hotel, a 14th-century structure, was most picturesque and the room in which I slept was occupied by the Emperor Napoleon in 1813 when he made the inn his military headquarters.

Although a great deal is written about the comforts of the old English inns, one must travel far to equal the joys of the French country *estaminet*. Can any other woman in the world hold a candle to the Frenchwoman for culinary inventiveness? During our run to the south we enjoyed many a delightful four-course luncheon which had been prepared from no more material than would be served up daily in British hotels in the prosaic form of "joint, two vegetables, and cheese."

We lunched the second day out of Paris under the shadow of the 13th-century Castle of Flassons, whose war-battered walls are in a wonderful state of preservation.

After three days of travel through the beautiful valleys of the Loire and Rhône, and a short stay at the great industrial city of Lyon, we espied a tiny blotch of deep blue on the horizon, and soon afterward we arrived at St. Raphael, a pretty little seaport on the Mediterranean.

Along the coast we ran through Cannes, Nice, and Antibes, to Monte Carlo. The perpetual sunshine was in marked contrast to our own dull, foggy winter. The French always say that the British are a gloomy race who take their pleasures sadly, a fact that may be attributed to the lack of sunshine in our island home.

FROM TRIM FRANCE TO CARELESS, BUT COLORFUL ITALY

Beyond Mentone, most delightful of all Riviera resorts, we crossed the Franco-Italian frontier from the neat trimness of France to the careless picturesqueness of Italy.

* See also "Our Friends the French: An Appraisal of the Traits and Temperament of Citizens of Our Sister Republic," by Carl Holliday, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1918.

Photograph by Major F. A. C. Forbes-Leith

A BEAUTIFUL OLD INN AT BRIARE, NEAR PARIS

This picturesque village, 70 miles south of the French capital, was the first stop on the southward journey to Nice. The inn was used by Napoleon as military headquarters on one occasion in 1813.

A great change has come over Italy since 1919. In that year, when I passed through the kingdom from north to south, everything was in a state of chaos. Anarchy was rampant, the police and army corrupt, and for any officer to show himself in the streets in uniform was to court insult. Unemployment was a problem that threatened the very heart of the country.

But after six years one cannot fail to be impressed with the new Italy. The police force is efficient, the army operates normally, seemingly every factory is working, government sinecures have been reduced to a minimum, and there is work for every one. His admirers attribute this change, in the main, to Mussolini.

We soon reached Genoa, that great seaport which, next to Marseille, I regard as the most cosmopolitan city in the world.* As one sits for half an hour outside any of the great cafés, sipping an aperitif, he sees people of nearly every nationality. Arab and Hindu, Chinese and Turk, Moor and Russian, Malay and Japanese, in native costume, pass to and from the docks where, in that great rendezvous, the ships of all the nations of the world meet.

We traveled from Genoa across the fertile plains of Lombardy, on roads which, although perfect in surface, are thick in dust. The Italian chauffeur seems to have only one method of driving, and that is by "treading hard on the gas" from start to stop. Care of engine or tires is nothing to him, and road regulations mean little more.

In historic Padua, the hotel proprietor informed me that in his city the chauffeurs did not worry about rules of the road, and his logic in support of such a policy was very amusing. He argued that,

* See also "Frontier Cities of Italy," by Florence Craig Albrecht, in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1915, and "Inexhaustible Italy," by Arthur Stanley Riggs, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1916.

Photograph by Maynard Owen Williams

LOOKING DOWN ON THE QUAI DES ETATS UNIS, FORMERLY THE QUAI DU MIDI, FROM THE CHÂTEAU HILL: NICE

Beyond the pier known as the Jette Promenade the esplanade becomes the Promenade des Anglais. In the lower part of the picture can be seen the flat roofs of adjoining houses and shops which once formed the "Terraces," the parade of fashion before the Promenade des Anglais became famous.

Photograph by Maynard Owen Williams

A DAIRY SHOP, POULTRY STORE, AND GAME EMPORIUM BESIDE THE OPEN-AIR MARKET IN THE COURS SALEYA: NICE

as there were no rules enforced, every one had to take such care in driving that there were very few accidents!

THE MOTOR BOAT VIES WITH THE GONDOLA IN VENICE

The old architecture of northern Italy afforded us a continuing panorama of interest as we drove on to Venice.* Here, in a gondola with a picturesque gondolier, we wandered through the canals, past the haunts and homes of the doges.

One thing has tended to spoil the romance of Venice—the swarms of motor boats and launches that infest the Grand Canal. The raucous note of their warning hooters is a poor contrast to the musical, warning call of the gondolier's voice as he comes to a bend or a corner.

What a unique personality is the gondolier! He is the cabman of Venice, a city which contains no vehicle larger than a wheelbarrow. And yet he is a man apart from his confrères in other lands. Consider the taxi drivers in any city, the jarvey in Ireland, the donkey and camel men of Cairo. Generally, they are the natural enemies of anyone who hires them. But not so the gondolier, for, from the minute you embark in his craft he is a friend who takes you under his wing.

If you do not understand Italian, he has a language of his own that enables him to tell you about everything that you see, whether you are British, American, Latin, or Scandinavian. If you leave him for an hour, he does not worry, and you will find him singing happily to himself on your return. The gratuity which you offer at your destination is accepted with words of gratitude, and a romantic bow and flourish of the hat that are reminiscent of the chivalry of the Middle Ages.

On we moved, across the Italian-Austrian battle front, through miles and miles of concrete trenches, gun emplacements and redoubts, soon crossing the 1914 frontier. We stayed a while at Monfalcone, formerly a city of old Austria, where an extraordinary change of

*See also "Venice," by Karl Stieler, in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1915.

conditions was observed. This town presents a sad sight, little changed since the Armistice. The ruins of hundreds of buildings remain as they were after the Italian shells destroyed them. On the débris have been built ragged huts of wood and iron. The depressed inhabitants stood at their doors and apathetically watched us pass. They seemed to have lost their all, including their interest in life.

Photograph by G. R. Ballance

A STREET SHRINE IN MENTONE

COMMERCE DESERTS BEAUTIFUL TRIESTE

From here we had a long, steady climb through beautiful country and an hour before sunset breasted a hilltop and came suddenly upon one of the most glorious views I have ever seen — the city of Trieste, 1,500 feet below, beside a sea of blue glass.

Every building was of a different color; large liners at anchor looked like canoes. A white, gradually widening streak in the sea indicated the wash of a high-speed motor boat which was hardly visible to the naked eye. A large sailing ship, becalmed, seemed but a small speck of white.

This beautiful city has fallen upon hard times. Formerly the greatest port in the Austrian Empire,* commerce has declined since the city changed hands. There is little shipping in the harbor, and crowds of unemployed loaf about the sea front. Its one bright and busy spot is the factory recently acquired by Henry Ford for assembling his ubiquitous automobiles. This is growing daily and giving employment to many.

* See also "The Land of Contrast: Austria-Hungary," in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1912.

THE FIUME "LIONS" OF ITALY'S POET-SOLDIER

Our next stop was at Fiume, the scene of the *coup* of Gabriele d'Annunzio, Italy's poet patriot. It is also a fine port, but a mean city in comparison with Trieste. A narrow river separates it from Susak, the Yugoslavian frontier town.

An impressive sight in the city was the great number of apparently idle young men with shock heads of hair fluffed out like a lion's mane. We thought this must be the latest thing in Fiume masculine styles until an English-speaking friend explained that this is the hall mark of

YOUNG STREET MUSICIANS OF GENOA

"Next to Marseille, I regard Genoa as the most cosmopolitan city in the world" (see text, page 194).

d'Annunzio's "lions," who, with him, captured the city.

We were warned not to upset any of them, as they have the reputation of being excessively irascible and a law unto themselves.

After a night in Fiume, we crossed the frontier bridge to Yugoslavia. The incredible change made by those few yards is impossible to imagine—a jump from stagnation and slackness to hurry and bustle.

The only place into which the general energy had not penetrated was the customhouse. We had a letter of introduction to the chief revenue officer, who told us that, as a great favor, they would rush us through the formalities. The "rush" required six hours to deal with our small outfit!

The officials seemed to like our company. As soon as the papers were passed to a fresh clerk, he would come and have a friendly chat with us on European politics, our trip, and, in fact, anything but the business concerned. They were so cheery and genial that we could not take offense; so we smoked endless cigarettes and waited.

EVERY VILLAGE CAFÉ IN YUGOSLAVIA HAS ITS ORCHESTRA

We were now in a new kingdom, a charming country of delightful, music loving people. Every little village café has its orchestra of young men playing the guitar and mandolin, and accompanied by a trio or quartette of girl singers. The former stand and play; the latter sit in a row in front and sing national songs from dusk to midnight.

The Croats and Serbs are fine fellows of good physique, very hard workers, great patriots, and among the finest soldiers in the world.

Serbia, before the World War, was spoken of as a little Balkan state; now she must be reckoned as a power in Europe.

At Agram (Zagreb), the capital of Croatia, formerly part of the old Austrian Empire, we had a shock that made us rub our eyes. In front of us at the first crossroad, was the embodiment of an

Photograph by Donald McLeish

THE FAMOUS WINGED LION COLUMN OF VENICE

In the background rise the domes of the church of Santa Maria della Salute. "Here we wandered through the canals, past the haunts and homes of the doges" (see text, page 196).

Photograph Courtesy of Royal Italian Embassy

LOOKING DOWN UPON TRIESTE

This beautiful city, which before the World War was the chief seaport and naval base of the Austro-Hungarian Empire, has fallen upon hard times during the last ten years. There is little shipping in the harbor and the busiest spot in the city is the assembling plant for an American make of automobile (see text, page 197).

English policeman, with helmet, uniform, and baton complete. We heard afterward that the whole police force of the city was modeled and trained on British lines, even uniforms being supplied by outfitters in England.

In atmosphere, architecture, and general plan, Agram is a miniature Vienna. It has a fine opera house, and the architecture is for the most part typically Austrian.

Living is very cheap here for the man who carries either the pound sterling or the dollar.

BELGRADE EMERGES FROM WAR DEVASTATION

From Fiume onward, the war-worn roads had almost ceased to exist, and we had a weary struggle to Belgrade, capital of the Kingdom of the Serbs, Croats, and Slovenes.

A ruin at the time of the Armistice, Belgrade has made a wonderful recovery. In five years 4,000 new buildings have sprung up, and all the railway bridges and culverts which were destroyed have been rebuilt. Nearly every contract for reconstruction work has gone to Germany.

The Serbian government took a kindly interest in our plans, and wired ahead to every village on our route, ordering the various chiefs of police to do everything possible to assist us.

As we moved slowly south, the gradual change between West and East became more and more noticeable. In Nish the hat was being replaced by the tarboosh, carts by pack animals, and the water seller, with his laden goatskin, rattled his cups to attract attention.

All the Balkan nations live in a state of continual suspicion of each other and keep their frontiers in disrepair, deliberately making the railway the only easy means of passing from one country to another.*

IN THE LAND OF ATTAR OF ROSES

The road into Bulgaria had long been blocked by huge landslides, and in the Dragoman Pass we were obliged to take to, and run along, the river bed for miles.

On arrival at the frontier, we were informed by the chief customs officer that we were to be sent through the country duty free, as the government had taken an interest in our effort.

I have traveled in many countries, but have never met a people so delightfully hospitable as the Bulgars. Agriculturists with war-loving tendencies, they go out of their way to make smooth the path of the stranger within their gates. It was almost impossible to realize that we were passing through the territory of a former enemy.

One of the chief industries of the country is the cultivation of roses for making attar of roses. The industry is fascinating, and to be continually surrounded by thousands of acres of these beautiful flowers must tend to produce a happy peasantry.

As we passed through miles and miles of roses in bloom, it was delightful to see in the fields hundreds of women and children, in brightly colored short skirts and blouses, singing merrily as they labored.

AN AUDIENCE WITH KING BORIS OF BULGARIA

On our second day in Sofia we had word that the King, Boris III, would be pleased to receive us the following afternoon. At 4 o'clock, the appointed time, we rolled up in our well-worn tweeds and flannel trousers, that had been innocent of a pressing for many weeks.

Remembering Balkan tradition, I had visions of passing through lines of splendidly uniformed courtiers, to tremble in front of a magnificent throne, to kiss, perhaps, the hand of a monarch arrayed in purple and ermine, and to retire backwards, bowing with much ceremony. I could not see our travel-stained figures fitting into the picture.

An equerry told me that His Majesty would receive me alone, and that after the audience I was to introduce my friends and "Felix."

I was ushered into a large room, where a man of athletic figure rose from a desk, came forward, took me by the hand, and led me to a chair. In perfect English, and with the most engaging smile, he said, "Welcome, Sir, to my country. I am delighted to see you." I was at ease imme-

* See also "The Whirlpool of the Balkans," by Hon. George Higgins Moses, in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1921.

Photograph from Ernest Peterffy

A VENDER OF WOODEN PAILS AND BARRELS HAVING AN AFTERNOON NAP AT FIUME

For a short time after the World War Fiume enjoyed a distinction similar to that of Danzig; it was a Free City, under the jurisdiction of the League of Nations, and was supposed to serve the joint interests of Italy and Yugoslavia. In January, 1924, however, the two countries agreed that Fiume should go to Italy and Baros to Yugoslavia. Fiume was the scene of D'Annunzio's spectacular exploit (see text, page 197).

diately and soon forgot that I was chatting with a reigning monarch.

In matters pertaining to motoring, the King is an expert. He always drives his own car, and, on his country estate, may often be seen plowing with an American-made tractor.

I told His Majesty that, owing to bad roads in Serbia, we had on a certain day run only 15 miles. He laughed, and claimed to have beaten my record once on that same road during the war, when he was able to go only two miles in 12 hours, and added that on another occasion he drove for 22 hours continuously. "I went to sleep," he said; "the car left the road and overturned. Luckily I was not hurt, and, after an hour, some people turned it the right way up, and I went on!"

We were joined later by Princess Eudoxia, the King's charming sister, and

PREPARING WOOL FOR CARPET WEAVERS: YUGOSLAVIA

Photographs by Major F. A. C. Forbes-Leith

YUGOSLAV WEAVERS DISPLAYING A RUG: PARADSHIN

Five women can make one of these small rugs in a fortnight. The work is done entirely by hand. Paradshin is midway between Belgrade and Nish.

© Hungarian Press Photographic Exchange

SOUTHERN SLAVS OF THE SAVE RIVER BASIN

The Slavs of this region are in easy circumstances. They are agriculturists and vine growers, and in addition they carry on home industries, such as weaving, embroidering, and linen manufacture. They are very fond of ornaments, especially necklaces made from Hungarian five-kronen silver pieces. As a race, they are a mixture of Turk and South Slav. Their cultural development was greatly injured during the supremacy of the Tatars and the Turks. The young woman is showing a girl's method of dressing the hair, but she wears a woman's cap.

went down to the grounds of the palace, where they examined every detail of our car. A pleasant hour passed too quickly.

Next day the president of the Bulgarian Automobile Association arrived as we were leaving our hotel. He led a procession of 30 cars, formed as an escort to give us a send-off. We stopped in the park, where short speeches were made, and were presented with bouquets. I was relieved when the ceremony ended, without the painful necessity of going through the Gallic custom of exchanging kisses!

THE DIVIDE BETWEEN EAST AND WEST

A day's journey east brought us to country which, up to a few years ago, was part of the Turkish Empire. The trim, whitewashed villages of Bulgaria were now replaced by the shabby, gabled buildings of the Turk. We came upon an object which convinced us that we had passed the great divide between East and West. It was a dead horse, surrounded by hungry, gorging dogs.

When a Mussulman's animals grow infirm, he turns the poor beasts out to die, or to be dragged down by scavenger dogs, because he has a prejudice against taking their lives. In the same way, beggars in the Orient carefully remove vermin from their bodies and place them gently on the ground for others to acquire!

Continual cloud-bursts and thunder-storms dogged us for many days. On the Bulgarian-Turkish frontier, many bridges were washed away, making progress almost impossible. On many occasions cartloads of timber had to be taken along for the construction of temporary bridges. On the actual frontier, Bulgarian and Turkish soldiers united their efforts to get us through the swamps.

In Turkey our troubles commenced and, officially, we found the Turk rather difficult to deal with. At Adrianople we were regarded with suspicion, particularly on account of my rank in the British Army.

The authorities thought we were spies and, to delay us, demanded over £300 duty on our car and its contents. I refused it and insisted on waiting until we reached Constantinople, where I could consult with our consul general. They declined, but promised to refer the question by telegraph to Angora, the capital.

In the meantime, although we were not actually prisoners, we were forbidden to leave the city. Ennis Behidj Bey, representative of the Turkish Foreign Office in Adrianople, was extremely polite, and when obstruction is handed out with excessive courtesy, it is hard to deal with.

A TURKISH BOY WITH BRAIDS IN MEMORY OF TWO SISTERS WHO HAVE DIED: YUGOSLAVIA

ADRIANOPLE IS A FORLORN CITY

The unfortunate city of Adrianople has changed hands three times since the Balkan War of 1911-13. In those days it boasted 110,000 inhabitants, whereas now it has barely 55,000. Since 1923 all Greeks and Armenians, who handled most of Turkey's commerce, have been expelled from the country. Whole streets of houses and shops stand deserted; even shutters and window frames have been wrenched off by the Turks for firewood. The Armenian church was doing duty as a stable for the horses of a Turkish cavalry regiment.

After five days' delay, with no answer from Angora, I went to the Government House and bearded the Wali, or Governor. He was a stout, prosperous looking Turk, who politely apologized for inconveniencing us. I requested, with equal politeness, a permit to proceed to Constantinople, where I could settle matters with the help of the British consul. This, he said, to his great regret, was impossible.

I then told him it grieved me to think that, as special correspondent of important newspapers in various parts of the world, I could not write as well of Turkish hospitality as of the hospitality received in other countries. This mention of the press made him thoughtful; presently he changed his mind and told us we might go.

With immense relief we shook the dust of Adrianople from our feet, and moved on to Constantinople through mud and swamp, churning our way in impossible country. After four weary days we rested in the shadow of Sancta Sophia.

Constantinople of to-day is very different from the city of 1919, for the policy now is "Turkey for the Turk."

When we sought help from Aduan Bey, an enlightened member of the Kemalist Government, he could not understand why anyone should wish to get to India by automobile. "There are no motor roads

Photograph by Ewing Galloway

A NEIGHBORHOOD CORN-SHELLING IN YUGOSLAVIA

Fourteen women and children have gathered to shell the crop of one farmer. In the background are two fodder stacks for cow feed during the winter months.

in Asia Minor," he said. "Why not put your car on the train? You can cross to the Syrian border in three days, without any trouble, and with much less expense."

When we insisted, I am sure he was convinced that we were spies, for all along our route the police and military were warned to watch us wherever we stopped.

It is of interest that some months later this same minister was responsible for a law which compels all male Turks in Asia Minor to put in free labor for seven days a year on the building of motor roads. Apparently our little journey showed him the possibilities of mechanical transport.

THE ROYALIST-REFUGEE TRAGEDY OF CONSTANTINOPLE

The greatest tragedy of Constantinople is the royalist refugees from Russia, of whom thousands still remain.* Some brought enough wealth on which to live

* See also "Constantinople To-day," by Solita Solano, in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1922.

Photograph from Ewing Galloway

A STREET SCENE IN BELGRADE, CAPITAL OF YUGOSLAVIA

Belgrade nowadays is a lively city of 110,000 inhabitants. For hundreds of years it was a buffer fortification between the East and the West, the scene of many battles between Turks and Christians, first in the hands of one, then in the hands of the other. In 1866 it was finally handed over to the Serbians. It has experienced a wonderful rejuvenation since the World War, 4,000 new buildings having sprung up in the last five years. Wide, clean streets, beautiful buildings, electric lights, electric trams, a national library and a royal palace commend it to the Western traveler.

decently; some started businesses and are making a comfortable living by hard work. The majority, however, seem to have lost all hope and to have sunk to the lowest depths.

As I stood at the door of that world-renowned hotel, the Pera Palace, a drunken man in rags passed, unwashed, with long, unkempt hair and beard, and with shoes tied to his feet with pieces of string. He was once a famous general in the Tsarist Army. His case is not unique.

With the women it is worse. Many of title have put their shoulders to the wheel and taken jobs—when they could find them as servants and waitresses; the greater number, however, have been less fortunate.

Photograph by Major F. A. C. Forbes-Leith

KING BORIS III EVINCES GREAT INTEREST IN "FELIX THE SECOND"

The Bulgarian monarch is seen inspecting the automobile in which the author had traveled from England to Sofia. In the background is Mr. Allan Wroe, a member of the expedition.

Photograph from L. G. Popoff

AN AIRPLANE VIEW OF THE CATHEDRAL OF SAINT ALEXANDER NEVSKI: SOFIA, BULGARIA

This, one of the finest examples of Byzantine architecture, was consecrated in the Bulgarian capital a few months ago.

© Ewing Galloway

THE 16TH CENTURY MOSQUE OF THE SULTAN SELIM II: ADRIANOPLE

Once a prosperous city of 110,000 inhabitants, Adrianople has suffered many reverses since the Balkan wars of 1911-13. To-day it is a forlorn outpost of Turkey-in-Europe, with an impoverished population of less than 60,000 (see text, page 205).

We crossed the Bosporus and moved off on a road built by Alexander the Great about 330 B. C., and probably not repaired since. For 880 miles after leaving Skutari, our average speed worked out at two miles an hour! Many weary hours and days were spent in negotiating swamps, hills, mountains, landslides, and broken bridges.*

We moved along many places where no wheeled vehicle of any sort had passed for 20 years, but our car emerged triumphant.

THE ANATOLIAN PEASANT IS ONE OF NATURE'S GENTLEMEN

If the Turk officially is sometimes an obstructionist, as an individual he is one of the most charming of men. We were the recipients of many little acts of kindness and courtesy from both rich and poor in Asia Minor.

The peasant of Anatolia is one of Nature's gentlemen.* At a village where we stopped soon after leaving the Bosporus, a strapping, fair-haired farm laborer left his work in the fields to run up and ask, "You Ingles, Sah?" We replied in the affirmative, and he shook hands warmly with us all. "Me prisoner of war with Ingles two year," he said. "Ingles very good to prisoner, give plenty food, good clothes, no make Turk prisoner work too much."

In nearly every village we were welcomed by one or more ex-prisoners of war, who would insist on supplying us with food for which they would not accept payment.

As we were now far from hotels, we existed on the food of the country. Eggs, curdled milk, dried curd cheese, thin cakes of unleavened bread made of roughly crushed barley, fruit of all kinds, and an

* See also "East of Constantinople: Glimpses of Village Life in Anatolia," by Melville Chater, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1923.

* See also "Crossing Asia Minor, the Country of the New Turkish Republic," by Major Robert Whitney Imbrie, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1924.

Photograph by Ernest B. Schoedsack

TYING RAGS TO THE WINDOW OF A SHRINE AND MAKING A WISH, PRACTICED BY THE WOMEN OF ANATOLIA

occasional chicken formed our staple diet. We went for days without seeing or eating meat.

At night we erected our camp beds beside the car, and, although in a dangerous country where brigandage was rife, we slept without guard, for after the strenuous work of the day we were too fatigued to do more than roll into our sleeping bags.

AMONG THE WHIRLING DERVISHES OF KONIA

Halfway across Asia Minor, we stopped at Konia, capital of the Turkish Empire up to the end of the Seljuk dynasty. It is a picturesque old city, and contains the monastery and mosque which are the headquarters of the Mevlevi sect of dervishes. Although fanatical in many ways, they are among the least so of all Moslems in their attitude toward Christians. We called at the monastery and took coffee with the Father Superior.

These dervishes lead pure and saintly lives and practice the virtue of charity.

We were handed over to a bespectacled, benevolent, white-haired old dervish, who wore a loose robe of rough cloth, similar to that worn by monks in Europe, and a rough felt hat shaped like a sugar cone. He took us to the mosque, where, at the door, we removed our shoes, but retained our hats.

This building contained the tomb of Mevlana Jelal ed-din Rumi, who founded the sect in the 13th century, and the tombs of all the succeeding patriarchs. In many instances the tombs are covered with gold plates, and on each one rests the turban of the departed, together with a lamp ready-filled with oil for use on the day of resurrection. The mosque itself is decorated with wonderfully colored tiles, and gold, silver, and precious stones.

We were shown the well-worn floor, where for centuries the dervishes have executed their fanatical dances. It was hard to imagine that the old gentlemen we met could endure the tremendous nervous and physical strain involved in spinning around like tops for 20 minutes without halting (see also page 212).

Forward we went on our weary way, sticking in rivers for hours at a time, held

up by the accumulated landslides of years, bridging torrents on a few planks, climbing almost impassable hills, and plowing through swamps until we reached the mighty Taurus Mountains.

After passing through the Cilician Gates, we rode over the plains to Tarsus, birthplace of Saint Paul, thence to Adana, on the plain of Issus, where Alexander the Great defeated Darius, King of Persia.

Finally we crawled slowly past the Turko-Syrian frontier to Alexandretta, in a land where the tarboosh was replaced by the flowing headdress of the Arab.

Breasting the famous Beilan Pass, regarded in olden days as one of the chief defenses of Christendom, and passing the Lake of Antioch, where the Apostles fished, we soon struck the caravan track to Aleppo, and struggled against a hot desert wind that dried our skin to parchment.

Photograph by Merl La Voy

A MOHAMMEDAN WASHING HIS HANDS AND FEET BEFORE ENTERING A MOSQUE IN CONSTANTINOPLE

Long camel caravans, laden with carpets, spices, and rich merchandise of every kind from far-off places in Asia, continually passed us on their way to the coast. We saw the Persian from Meshed, the Turkoman from Bokhara, and the Arab from Bagdad.

We rode by a monument commemorating the last battle fought by General Allenby against the Turk in the Middle East,* and arrived shortly afterward at Aleppo, an ancient but unprepossessing city, and a great trade center.

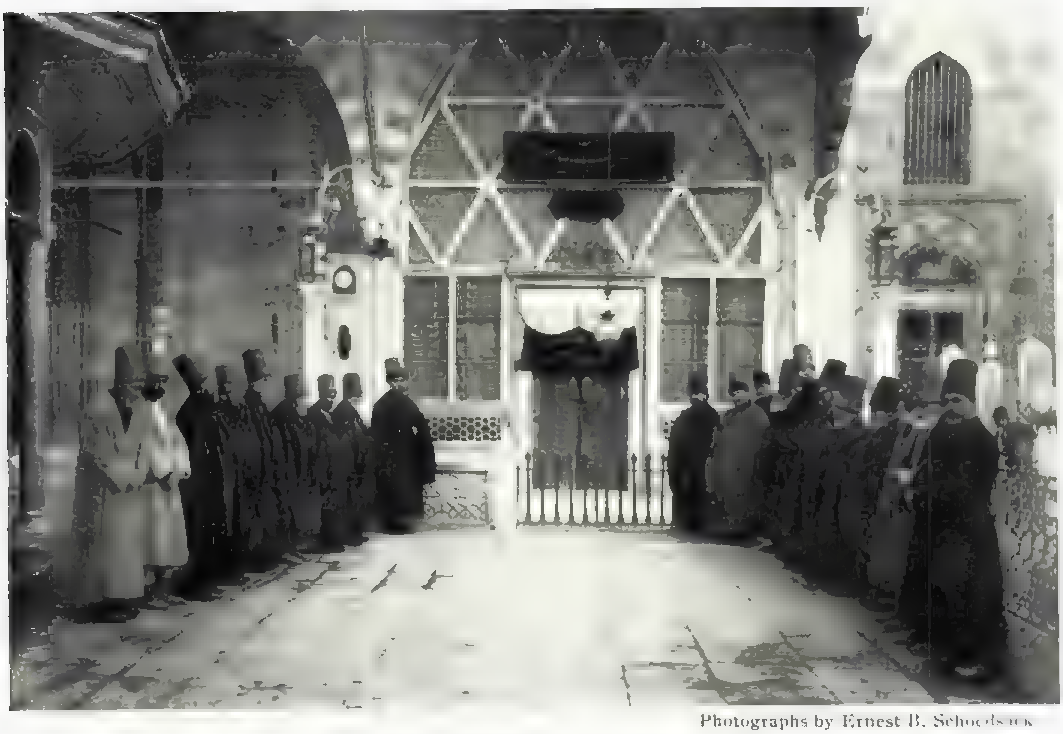
The next day we skirted the Syrian Desert, where migrating Bedouin tribes frequently crossed our path. Since these people are robbers by nature and tradition, we were warned by French authorities in Aleppo not to make camp, under any circumstances, except within the confines of a town or village.

THE AMERICAN TRACTOR PENETRATES THE DESERT

Once, when we stopped for water, a crowd of Bedouins surrounded us and fingered everything loose on the car. Our mascot mystified them, and they grew very suspicious of him. Suddenly one

* See also "An Old Jewel in a Proper Setting: An Eye-Witness's Account of the Reconquest of the Holy Land by Twentieth-century Crusaders," by Charles W. Whitehair, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1918.

TURKISH WOMEN OF KONIA, ASIA MINOR



Photographs by Ernest B. Schoedsack

AN ASSEMBLY OF WHIRLING DERVISHES IN THE MOSQUE YARD AT KONIA

This is the headquarters of the Mevlevi sect of dervishes, who received the author and his companions hospitably (see text, page 210).

© Keystone View Company

A MARKET STREET OF DAMASCUS

Everything is sold here, from onions and potatoes to brilliantly colored cottons and rugs. Although much modernized in some quarters, Damascus has lost little of its oriental charm for the Western visitor; for, while electric trams now run in some of the streets, the picturesque camel caravans from Mecca and Bagdad come and go as of old (see text, page 214).

© E. M. Newman

INLAYING SILVER INTO BRASS AT THE SYRIAN ORPHANAGE AT DAMASCUS

For centuries Damascus has enjoyed a worldwide reputation for the skill of its metal workers, giving rise to the term Damascus, or damascene, steel. The city was also famous in the Middle Ages for its silk and linen fabrics; hence the word "damask."

called out that he was "Shaitan" or "Satan." I set off as hard as I could without arguing with them.

A little later we came across proof of the penetrating influence of civilization, even in the desert—a large American tractor and plow being demonstrated to a crowd of Bedouin sheiks. They were as enthusiastic as children with a new toy.

At Khan Sheikhun, a picturesque Arab town, we camped one night on the roof of the local police station. This necessitated our keeping a much more careful watch than if we had remained in the open, for, of all the thieves in Syria, the native policeman is often the greatest.

Through the ancient cities of Hama and Homs we moved slowly, until, on the fifth day from Aleppo, we reached Damascus, the city of the seven rivers, and the ancient Paradise of the Moslem.

MODERN DAMASCUS HAS ANCIENT CHARM

Although modernized, Damascus has lost none of its charm. Electric trams run in the streets, but picturesque camel caravans from Mecca and Bagdad also come and go as of old. Damascus contains the tomb of that great warrior and enemy of the Crusaders, Saladin. Legend also gives Damascus as the place where Abel was murdered.

Here we had to prepare for a great test—the crossing of nearly 600 miles of desert to Bagdad. There is only one well en route, at Rutba, about halfway.

A transport company had already started a mail service on this route, with huge eight-cylinder cars. By condensing their radiator steam and averaging from 35 to 40 miles an hour, it is conducted with considerable success.

Crossing the desert with a small car, however, was a very different proposition, for, in addition to our usual load, an extra 200 pounds of petrol and water had to be carried. I engaged as guide a high-caste Bedouin, named Sulieman, who was reputed to know every mound and depression in the whole region.

Photograph by Ernest B. Schoedsack

A SILVER WORKER OF IRAQ

In Amara, near Bagdad, lives a religious sect whose members claim to be descendants of John the Baptist. All of them are silver workers, and many have shops in the Bagdad bazaar, where they advertise in English.

We started off one afternoon at 2 o'clock, and, after two hours' running in a hot following wind, were overtaken by a terrific sandstorm. I attempted to continue, but in a few minutes the sky was darkened with sand, and our eyes were too sore to allow us to move an inch. At that minute Wroe went down with a violent attack of fever, so I decided to make no effort to move until after sunset, when I assumed that the wind would drop.

THE DESERTCRAFT OF THE NOMAD

While waiting, Sulieman gave a demonstration of desertcraft, which illustrated the resourcefulness of the dweller in the waste. We were on a camel track, and he wandered about for a few minutes, collecting pieces of dry camel dung. After arranging these in a small hole scraped with his hands, he sat on the windward side, used his flint and steel, and had a fire blazing in a few seconds. Bringing a few small packages and a tiny copper pot from his pockets, he worked for a few minutes and produced an excellent cup of coffee.

We rested that night, and pushed on next day over the never-changing desert, with its glorious mirages. After 21 running hours we sighted the palm-fringed Euphrates.

The only living souls passed en route were a small tribe of Bedouins encamped at the Rutba wells. They were a filthy crowd who, living in a land where water is more precious than diamonds, consider it a crime to use this valuable fluid for anything but drinking purposes. The sheik was a most unromantic figure, some of whose clothing appeared to have been worn since birth.

BAGDAD'S ARABIAN-NIGHTS' SPLENDOR HAS DEPARTED

From the Euphrates, a run of two and one-half hours, brought us to the City of the Caliphs.*

* See also "A Visit to Three Arab Kingdoms," by Junius B. Wood, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1923.

Photograph by Thomas R. Owens

BAGDAD'S DRY DOCK: CONSTRUCTING A GUFAH

This bowl-shaped craft of the Tigris and Euphrates is a gigantic basket of woven reeds, usually plastered with pitch. When caught in a swift current, the passenger experiences a sort of merry go-round voyage.

Photograph by Eric Keast Burke

TWO DESERT ARABS OF HIGH DEGREE SMOKING THE WATER PIPE (NARGHILE) OUTSIDE A COFFEE SHOP

Notice the characteristic headdress—a dark-blue check handkerchief (*keffiyah*), folded diagonally, held in position by a double coil of wool or camel hair (*agal*)—and clothing, the tunic of fine material (*zibun*) and the cloak (*aba*). A Bagdadian, once asked whether he looked with favor upon the reforms of the new government, replied that all was a matter of indifference to him, provided his seat at the coffee shop was not interfered with or made uncomfortable!

Until Bagdad came into prominence during the World War, it existed in the minds of most people only as a mythical city, for in childhood they had read the fascinating Arabian Nights' Entertainments. In 1917, when the British forces entered the city, they were sadly disillusioned. I came to earth with a bump when a prominent Armenian citizen greeted me and said, "Welcome, Sir, to the City of the Seven Great Smells!"

This described it accurately; in fact, he might well have added, "and to the dust heap of the world."

Although Bagdad contained a population of nearly 300,000 inhabitants at that time, hardly a single thoroughfare was wide enough for two of the crudest and

Photograph by W. Robert Moore

ONE OF TEHERAN'S ORNATE CITY GATES

In the background is a portion of the great Elburz chain of mountains, which extends without a break across northern Persia from the western shore of the Caspian Sea to northeastern Khorasan. The loftiest peak of the range is Demavend, which rises to a height of more than 19,000 feet. (See, also, "An Ascent of Mount Demavend, the Persian Olympus," by F. L. Bird, in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1921.)

smallest carriages to pass. It was possible to shake hands across most of the streets from the upper windows.

Organized sanitation was nonexistent; cholera and smallpox continually swept through the city and took heavy toll. The streets were crowded with thousands of half-starved pariah dogs which acted as scavengers, and hunted at night in packs, to the danger of anyone who moved about unarmed.

HOUSES AND MOSQUES DESTROYED TO MAKE A THOROUGHFARE

When General Townshend was threatening Bagdad, and the Turks found it impossible to move their heavy guns through the narrow streets, they cut a way ruthlessly through house, bazaar, and mosque, creating a thoroughfare which extended the full length of the city from north to south.

This highway was called New Street by the British when they entered. It was then entirely devoid of metal. Ten minutes' rain made it a hopeless quagmire, absolutely impassable.

The Tigris, 300 yards wide, prior to the British occupation could be crossed only by a bridge of rickety old boats which sagged dangerously to anything heavier than a bicycle.

Added to all these discomforts was the climate. The summers are terrible, and during the months of July and August, the thermometer records temperatures of from 120° to 130° in the shade. Little wonder that Bagdad was formerly avoided by most Europeans.

THE BRITISH BRING CIVILIZATION'S CONVENIENCES TO BAGDAD

With the advent of the British a miraculous change has been wrought. Bagdad to-day is almost unrecognizable by those who knew it ten years ago. New Street is well metaled, and footwalks built of solid brick skirt the road. Two fine

bridges across the Tigris open and shut quickly by mechanical power to permit river traffic to pass, and both are approached by wide, metaled roads.

Hundreds of motor cars pass down New Street, and this traffic is controlled at every crossroad by an efficient police force. There is now a taxicab service of luxurious cars that cannot be equaled anywhere else in this part of the world.

Two miles outside the city, on what was barren desert a few years ago, has sprung up a new town where all the Europeans reside. Officials with their families live in comfort the year round in well-built bungalows, the last word in scientific, heat-resisting architecture, and fitted throughout with electric fans. An electric power station lights the buildings and streets, and ice factories produce at low cost an unlimited supply of this most necessary commodity.

Photograph by Basil Avezatlu

A PERSIAN BARBER IN GOOD HUMOR

As customers are only shaved about once a week, the clippers are first necessary. The hair of the head is also shaved from the forehead to the back.

Wherever the Briton has penetrated, he has taken his sport with him. The Alwiyeh Club, recently built on the banks of the Tigris, offers polo, tennis, and golf. A bathing parade I saw there one evening in August would have rivaled Trouville. There is also a fine race course with stands for all classes, where, in season, two excellent meetings a week are held.

BAGDAD IS STILL THE REAL EAST

A railway connects Bagdad with Basra and a motor mail service which bridges the Syrian Desert from Damascus (see text, page 214) has brought it within nine days' journey of London.

Nevertheless, Bagdad is still the real East. At the bazaar gates, where Indian, Arab, Persian, Kurd, and Turk rub shoulders, civilization has halted. The water seller carries his goatskin and sells to the thirsty; the money changer sits in a hole in the wall and rattles the British sovereign and Turkish lira to attract custom; the barber squats and shaves his client by the roadside.

In town, the rich merchant stops his luxurious motor car to allow a camel caravan from the borders of China to

Photograph by Major F. A. C. Forbes-Leith

"FELIX" BEING TOWED THROUGH THE SILVER SAND HILLS OF DASHT-I-LUT, THE GREAT CENTRAL DESERT OF PERSIA

These Persian peasants walked over 40 miles of waterless desert from their village and 40 miles back to tow the car through this impossible sand, which is seemingly without bottom. Their pay for this walk and their whole day's work amounted to one dollar per head, and they were happy!

pass into the desert where, five miles outside the city, the Arab still tills the ground with primitive implements such as were used in the time of Christ.

From Bagdad we visited the ruins of Babylon,* a city which in the time of Nebuchadnezzar was reputed to cover a greater area than New York and London combined. Excavations have disclosed the palace of that great king, the famous Ishtar Gate, the Hanging Gardens, and many other ruins of absorbing interest.

We also visited Ctesiphon, where the famous vaulted hall of the winter palace of the Parthian kings still stands in a wonderful state of preservation. It is built of brick, was erected without a molding, and, standing 115 feet high, is regarded as the most splendid example of Sassanian architecture.

* See also "The Cradle of Civilization," by James Baikie, and "Pushing Back History's Horizon," by Albert T. Clay, in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1916.

After a prolonged stay in Bagdad we moved on over 100 miles of desert to the foothills of Persia. A day later we climbed the famous Pai Tak Pass, and, on the great Persian plateaus, more than 6,000 feet above sea level, found relief from the scorching sun of the plains of Iraq (Mesopotamia).

PERSIA RESEMBLES SWITZERLAND

Persia is generally believed to be a barren desert. On the contrary, it is a glorious but vaster Switzerland. On every side except the east, it is surrounded by hills leading up in gigantic steps to a vast plateau extending to the west, north, and south, and dropping suddenly in central Persia to a great desert, the Dasht-i-Lut, whose saline swamps and dry salt area are more particularly known as the Dasht-i-Kavir.

The Persians are of pure Aryan stock, fairly similar to Europeans in appearance, but in temperament a race apart.

Photograph by Major F. A. C. Forbes-Leith

DAWN ON THE PERSIAN DESERT

The previous night the author and his companion, Mr. Redknap, stuck in deep sand, were 17 miles from the nearest water, which was almost salt. The Baluchistan Camel Corps Patrol passed and kept guard over them for the night. This spot is near the border of Baluchistan and at the extreme westerly edge of the Dasht-i-Lut (see text, page 222).

In 1920 I was managing the lands and courts of a feudal noble of Persia. During the trial of an intricate case one afternoon, the peace of the courthouse was disturbed by the wife of Yadullah, one of my laborers, who rushed in crying and showed two badly bitten fingers.

During her absence from her house a negress had come and helped herself to some firewood. As the intruder was leaving with the spoils, the wife of my servant returned and a fight ensued, during which the biting occurred.

MOSLEM DIVORCE IS SIMPLE

I was annoyed at being disturbed and told my personal servant, Hussein, to see Yadullah and tell him that he could deal with the negress himself. A few days later I asked Hussein if Yadullah had punished the negress.

"No, Sahib," he said. "He married her this morning!"

"Good gracious," I replied, "Whatever for?"

"Oh, you don't understand, Sahib," said Hussein. "If he not her husband, and he give her good hiding, he get into plenty trouble. So he marry her this morning, to-day he take all her things, and to-night he give her good hiding, turn her out, and divorce her."

As is generally known, divorce in Moslem countries simply consists in telling a wife, in the presence of two witnesses, to depart.

During Great Britain's occupation of Persia, which was a neutral country in the World War, a British soldier was killed by brigands near the lands which I controlled. As the British general in command of the district disliked to interfere with the internal economy of the country, he suggested that I take out some of my Persian soldiers to clean up the band.

Before I started, my employer suggested, "Ah, Major, you nevaire take zis man wiz ze fight, much better take him wiz 'ze politic.'"

I asked what he meant. "Well," he said, "you write him one letter and say, 'I very sorry all mans are against you, but I am your friend always. You come my house, you be my guest, I hide you, and not let police take you.' And zen, when he come, you take him queek!"

On we moved, through Kirmanshah, pausing a while at the tomb of Chosroes; thence through Hamadan, known in ancient history as Ecbatana, where we visited the alleged tomb of the prophetess Esther and the famous seven-walled citadel.* And so on to Teheran, the capital.

At Kirmanshah we met the sad procession carrying the body of Major Robert Whitney Imbrie, the late American consul who had been murdered by a fanatical mob at Teheran. The cortège was accompanied by many Persian officers of high rank who acted as an escort as far as the coast.

PHOTOGRAPHING IN PERSIA UNDER AN ARMED GUARD

In the capital we found that the word "camera" made every high official nervous, owing to the recent Imbrie tragedy, but eventually we were allowed to photograph under a strong escort. For the next few days our car was a veritable arsenal, conveying our guard of a Persian officer and two soldiers, all armed to the teeth.

We visited the palace and were privileged to see the famous Peacock Throne, taken by the Persians at the sack of Delhi. It is studded with precious stones and is reputed to be worth $30,000,000.

A feudal system still exists in Persia. Most of the land is owned by wealthy nobles, who pay a tax to the government. The system of taxation is now superintended by American advisers, who have been able to eliminate evasion and corruption to a large degree, although much malpractice still continues.

Corruption and bribery are rife, and, knowing the state of affairs so well, I pay homage to the American gentlemen who are fighting such an uphill battle in stamping out these vices.

THE PERSIAN FARMER IS HARD-WORKING, BUT CHEERY

Each noble is supreme governor over all who farm his lands. His tenants pay tribute in the form of money, chickens, sheep, grain, and other produce. The farmers, generally, are downtrodden. If they complain and incur the wrath of their master, he can throw them into jail, beat them, or treat them according to his pleasure.

As an individual, the Persian farmer is a clean-living, hard worker of fine physique. His hours of labor are from sunrise to sunset, and in his village, in spite of oppression, he leads a cheery, happy life.

Opium-smoking is the curse of the urban Persian, but as yet the farmers have not taken it up. Doubtless the healthy life the latter lead enables them to withstand any craving for artificially produced sleep.

At Teheran we had to leave Wroe behind with typhoid fever.

We moved off on the last stage of our journey through the salt desert of Kum and rested a while at Ispahan. This beautiful city was the Persian capital until the Afghan invasion in the early eighteenth century.

We now crossed a part of the country where many tribes were moving, and were chased for some miles by horsemen. Luckily we were on a plain and our superior speed enabled us to escape.

We stopped at the ruins of the city of Persepolis, that great relic of an early Persian civilization, which was burnt by Alexander the Great at the instigation, so legend says, of Thaïs the courtesan. On again to Shiraz, a city studded with magnificent trees, whose beauty makes it easy to understand that Sadi and Hafiz, the famous Persian poets, received their inspiration here.

NIGHTMARE PROGRESS THROUGH SAND

The next 750 miles to the Indian border were one long struggle with salt and sand in a country which in many places could not produce an egg or a blade of grass.

On the borders of Afghanistan, when we crossed the Indian frontier, our daily progress in the sand was a nightmare.

* See also "Persian Caravan Sketches: The Land of the Lion and the Sun as Seen on a Summer Caravan Trip," by Harold Weston, and "Modern Persia and Its Capital," by F. L. Bird, in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1921.

Photograph by Fred Bremner

A FRUIT STALL IN THE QUETTA MARKET

Before the British made Quetta an important army post in their line of defenses on the northwest frontier of India, the town was a group of dilapidated mud buildings. To-day it is one of the most popular stations of the Indian army and is the trade mart for western Afghanistan and eastern Persia. This was the objective of the author's automobile journey from Leeds, England, more than 8,500 miles distant by the route traveled.

Many times we had to take to the railway track, and bump over the sleepers. Frequently we moved behind a gang of coolies who cleared a way for us at the rate of about 450 yards per hour.

Twenty times in our last 20 days we came up against difficulties that nearly made us abandon hope, but we fought on until, weary and sore, we arrived on October 24 at our goal—Quetta.

Although we were five and one-half months on the road, we were running for only 96 days. Of the 8,527 miles covered, 3,000 were void of road or track, 1,500 were over waterless desert, and 100 over seemingly bottomless silver sand. We bumped for 249 miles over railway sleepers, and had to find our way around 150 broken bridges.

Our total bill for spare parts was less than $14. We used but two sets of tires and had only two punctures.

Photograph by Maynard Owen Williams

AT THE WHEEL OF THE "BOWDOIN"

Commander Donald B. MacMillan, leader of the MacMillan Arctic Expedition, is taking his turn at the helm. In the right background is Dr. Gilbert Grosvenor (in oilskins), President of the National Geographic Society, under whose auspices the Expedition goes into the Far North. At the left is Kennett Rawson, 16-year-old cabin boy, the youngest member of the Expedition. Dr. Grosvenor, who is an enthusiastic yachtsman, accompanied the Expedition from Wiscasset, Maine, to Battle Harbor, Labrador. The 15-ton oil-burning *Bowdoin* is the flagship of the Expedition. The U. S. Navy's personnel and airplanes are carried aboard the larger vessel, the *Peary* (see pages 225 and 226).

Photograph by Maynard Owen Williams

THE THREE NAVY AMPHIBIAN AIRPLANES ABOARD THE "PEARY"

In the right background stands Lieutenant Commander Richard E. Byrd, Jr., in command of the U. S. Navy personnel coöperating with the MacMillan-National Geographic Expedition in a search for land in the unexplored area of a million square miles lying between Alaska and the North Pole.

THE MacMILLAN ARCTIC EXPEDITION SAILS

MEMBERS of the National Geographic Society have been gratified at the exceptional interest shown in the MacMillan Arctic Expedition, which went North under their Society's auspices, with farewell tributes tendered by cities, States, and official representatives of the United States, and also with helpful coöperation on the part of our sister country, Canada, at Sydney, and of the Newfoundland provincial authorities at Battle Harbor and Hopedale, Labrador.

The Secretary of the Navy, Curtis D. Wilbur, has said that he regards the Expedition as the best equipped, both as to material and personnel, ever sent into the Arctic.

Airplanes will explore in days icy areas of the Arctic which would take months to traverse by dog sleds. Radio is telling the daily program of work which in years past would be shrouded in silence for months. For the first time in Arctic history, color photographers are recording, for members in early issues of their GEOGRAPHIC, the surprising tints of the Far North, the native life, birds and many beautiful Arctic flowers.

These new aids to travel and communication enable the Expedition to engage upon a program perhaps of broader exploration and scientific study than any expedition heretofore has attempted.

The flying of the U. S. Navy airplanes under the direction of Lieutenant Commander Richard E. Byrd, Jr., and his splendid personnel not only is epoch-making, but marks an important experiment in aviation that will focus the world's attention. If these air caravels of 1925 find a new continent, their pilots will win a place in the Hall of Fame of great explorers.

New chapters in our knowledge of birds and fish, of interest alike to scientist and sportsman, are being added by the

Photograph by Maynard Owen Williams

THE "PEARY" PUTS OUT TO SEA, WITH THE NAVY'S PLANES STOWED ON THE AFTERDECK

At the foremast flies the National Geographic Society's flag, which has been borne to all parts of the world.

studies of Dr. Walter N. Koelz, chief naturalist of the Expedition.

Information which will help navigate the ships and airplanes of the world is contained in the magnetic, tidal, and meteorological observations of Lieutenant Benjamin H. Rigg.

Another exceptional feature of the Expedition is its sponsorship, noted by Commander Donald B. MacMillan in his farewell message, radioed from Sydney:

"We are fully equipped for exploration and the scientific study of northern lands, with the aid of new methods, such as airplanes, radio, and color photography, and with a support which places all of us on our mettle.

"We are conscious of a high responsibility when the Government gives us its support, and when we set out under the auspices of the National Geographic Society, with its world-wide membership of 1,000,000 enthusiasts for geography and exploration, and when its President, Dr. Gilbert Grosvenor, is here to aid personally in our final preparations."

As soon as possible after the Expedition's return, Commander MacMillan will prepare for the NATIONAL GEOGRAPHIC MAGAZINE an authoritative account of the results of the adventures and achievements of the Expedition. This will be accompanied by the outstanding natural-color photographs and black-and-white illustrations from the 6,000 exposures The Society's photographers are making.

INDEX FOR JANUARY–JUNE, 1925, VOLUME READY

Index for Volume XLVII (January-June, 1925) of the National Geographic Magazine will be mailed to members upon request.

PRINTANIER!

Aptly is this dainty soup named "Printanier"—for it is made in the Springtime, just when the vegetables are youngest and freshest.

The beautifully clear soup is made with richest consomme of choice beef. The carrots and white turnips are cut in small fancy shapes, and celery, peas, Savoy cabbage, parsley and a touch of leek are in the fine blend. A Campbell's masterpiece, in high favor for the formal luncheon and dinner.

Serve it JELLIED also

Simply put the can in the ice-box overnight and the soup becomes a dainty, amber-colored jelly—a charming delicacy.

12 cents a can

Campbells' Soups

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Visitors from foreign countries invariably wonder at the number of telephones in America. "Why is it," they ask, "that nearly everybody in America has a telephone, while in Europe telephone service is found only in a limited number of offices and homes?"

First of all, telephone rates in the United States are the lowest in the world for the service given. Here, since the beginning, the best service for the greatest number of people has been the ideal. By constant improvement in efficiency and economy the Bell System has brought telephone service within the means of all. From the start, its rate policy has been to ask only enough to pay fair wages and a fair return on investment.

The American people are eager to adopt whatever is useful. They have found that Bell telephone service, comprehensive, prompt and reliable, connecting them with the people they wish to reach, is worth far more to them than the price charged for it.

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Velox is the only photographic paper made exclusively for amateur negatives.

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Amateur negatives, made under entirely different conditions—the contrasty glare of outdoor sunshine—demand quite another.

Velox is *not* a dual-purpose paper. It is made solely for amateur negatives—and these it fits exactly.

A "Velox" print is readily identifiable by the name lightly tinted in the paper on the back.

Eastman Kodak Company, Rochester, N.Y., *The Kodak City*

The holders *differ–*

but either stick gives the famous

Williams *lather*

Why should we make two forms of shaving sticks? Here's the answer: Our whole effort is to meet men's tastes and fancies.

Recently we brought out Williams Doublecap. This stick has a unique holder. Notice the ample space for your fingers. We get letters from enthusiasts saying this stick is the best on earth.

But Williams Holder Top has just as many followers. This stick has a threaded metal band on the end which screws into a metal holder. *No chance of the soap working loose* in either Holder Top or Doublecap.

Whichever stick you select, remember this: With either you get real Williams lather!

As every Williams user knows, this lather has never quite been equalled. It bulks up thick on the face from the very start. It holds moisture, packs it in against the beard so that quick and thorough softening takes place.

After the shave, your face feels soothed and cool, for Williams lather is even more gentle and mild than the finest complexion soap.

Ask your dealer to show you both sticks.

Aqua Velva is our newest triumph—a *scientific* after-shaving preparation. A few drops keep the face like velvet all day. We will send a 150-drop test bottle free. Address Dept. 58, The J. B. Williams Co., Glastonbury Conn. (If you live in Canada, address The J. B. Williams Co., St. Patrick Street, Montreal)

Williams
Shaving Sticks

DOUBLECAP

This new but already popular shaving stick gives you a firm, full hand hold even when the stick is worn down until it is nothing but a thin wafer.

HOLDER TOP

Like Doublecap, the stick is held by a threaded metal ring—no chance of its working loose. There are Reloads for both these Williams Shaving Sticks.

Every Month Sees Demand Growing Greater

There has never been any let-up in the veritable clamor for the Chrysler Six since Walter P. Chrysler's remarkable achievement was first launched.

The public grows more and more enthusiastic over the car's unequaled results, more and more appreciative of quality and performance, riding and driving abilities, road-ability and economy that cannot be enjoyed elsewhere at any price.

The Chrysler was inspired by a vision and it was designed and manufactured to meet a demand for a car of medium price with qualities that hitherto belonged exclusively to high-priced, heavy and uneconomical creations.

Sales mounting to new high peaks monthly indicate that the Chrysler Six has not only satisfied this demand but has gone far beyond.

The Chrysler Six, of course, includes many proved engineering developments which, since introduced by Chrysler, have changed all standards of motor car quality.

Among these are the Purolator—an oil-filter that automatically and continuously cleanses all the motor oil; an air-cleaner that keeps road dust and grit out of the cylinders; seven-bearing crankshaft and camshaft; thermostatic control of motor heat; a new type of rear spring suspension that eliminates side-sway; Watson stabilators which, by compensating for all road inequalities, positively eliminate rebound shock at any speed, and a score of others.

The best way to understand Chrysler advantages is to let your nearest Chrysler dealer translate them into terms of actual performance. He is eager to have you ride in the car and drive it.

Touring Car, Phaeton, Coach, Roadster, Sedan, Royal Coupe, Brougham, Imperial and Crown-Imperial—attractively priced from $1395 to $2195, f. o. b. Detroit subject to current goverment tax.

Bodies by Fisher on all Chrysler Six enclosed models. All models equipped with balloon tires.

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No wonder. They ride upon considerate pulleys of Good Hardware—Corbin. Corbin window lifts that believe in being useful besides beautiful, raise and lower them. And sturdy Corbin fasteners securely bar outsiders.

Not only for "easy-working windows" but for every hardware need of every kind of building there is Good Hardware—Corbin. In great office and public buildings you will find it—in humble cottages and magnificent homes, in schools, hotels, stores and factories.

Perhaps you are building, planning to, or just thinking about it. If so, make note of this: Good Hardware—Corbin—is a joy to live with.

"Good Buildings Deserve Good Hardware" is considered the most interesting and readable booklet yet issued on hardware. Perhaps you would like to receive a copy. If so, write us.

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A Six far advanced in engineering 38 horsepower • • brisk getaway flashing pick-up

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The new Overland Six has many definite advantages in its price class . . . 112¾ inch wheelbase . . . larger main bearing surface . . . pressure feed lubricating system . . . oil-tight universal joints . . . beautiful two-tone color finish . . . unusual leg room and comfort . . . *Now a closed car value beyond comparison!*

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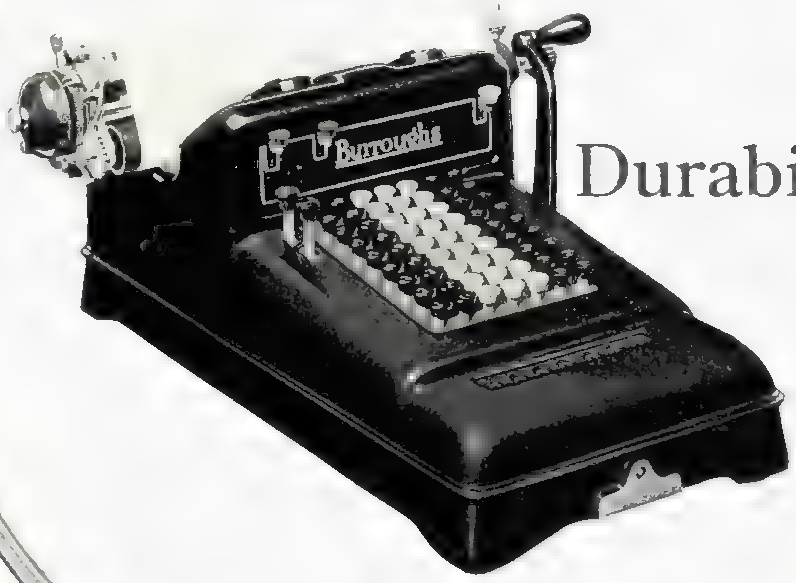

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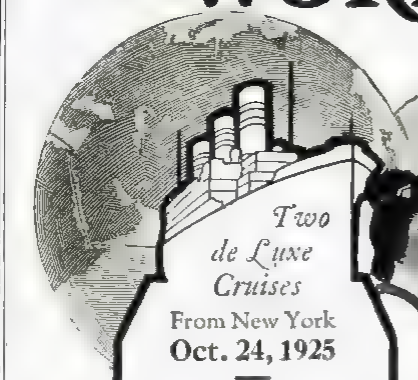

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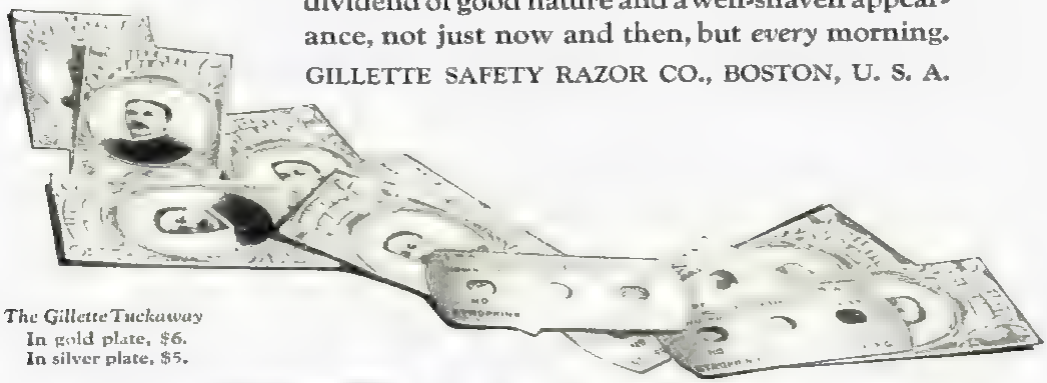

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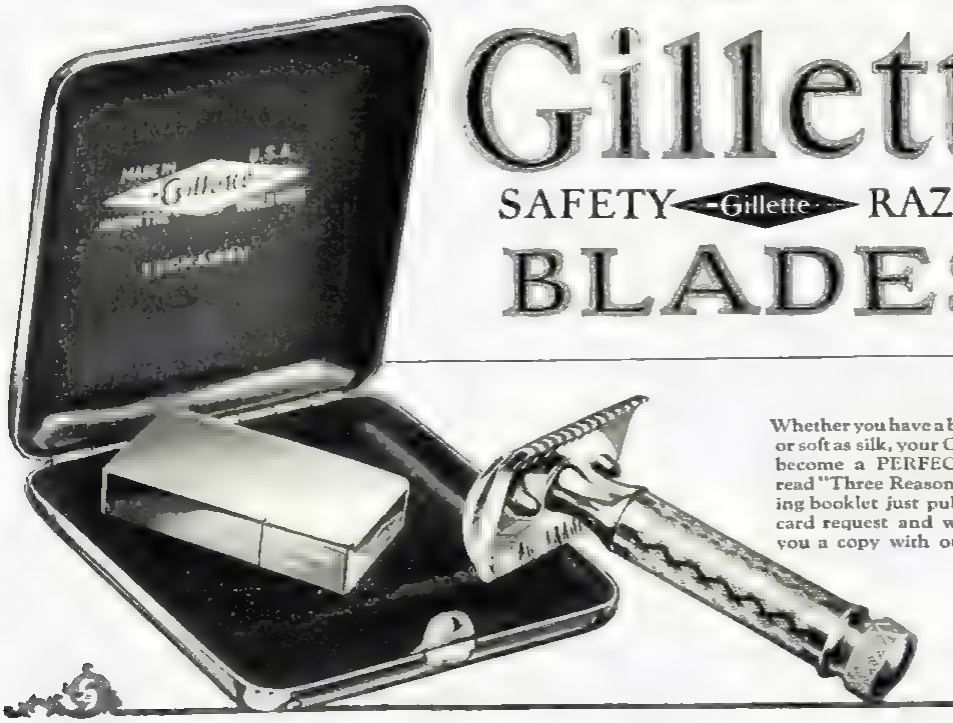

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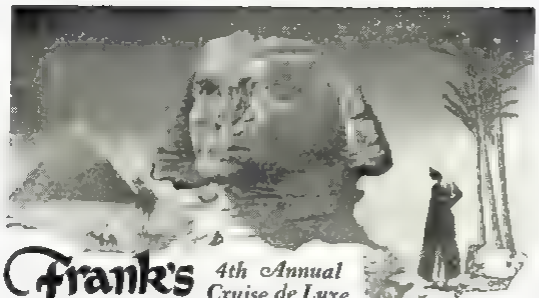

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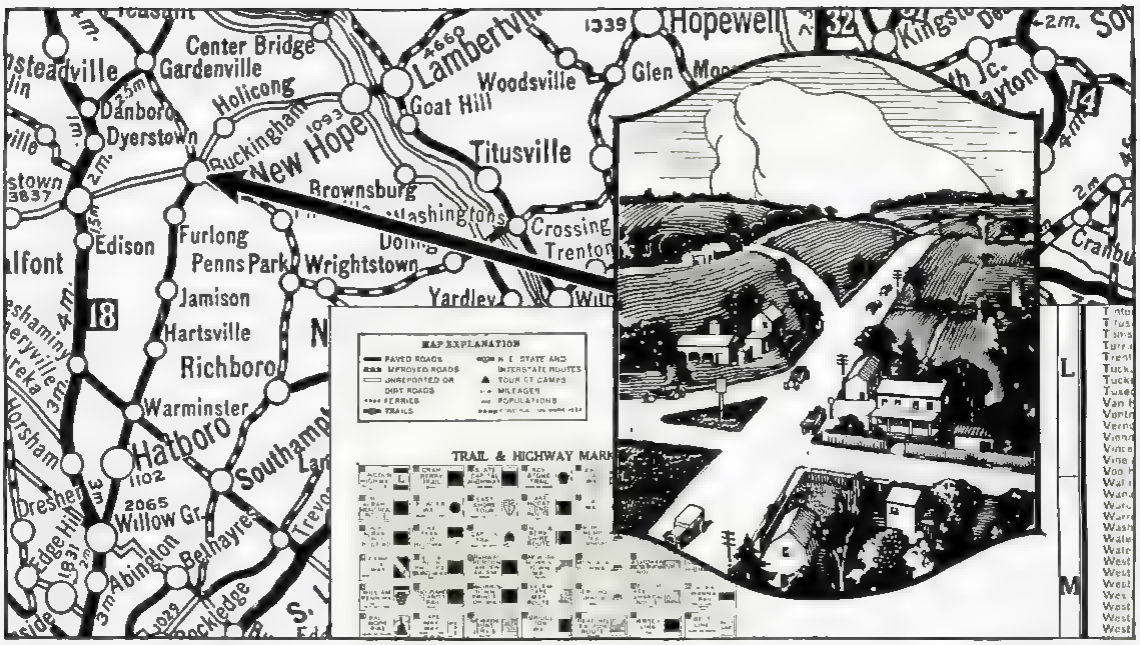

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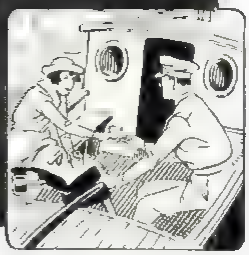

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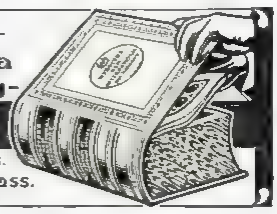

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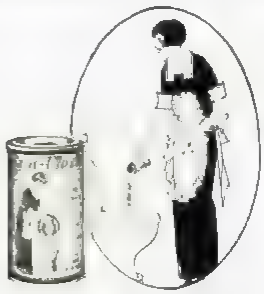

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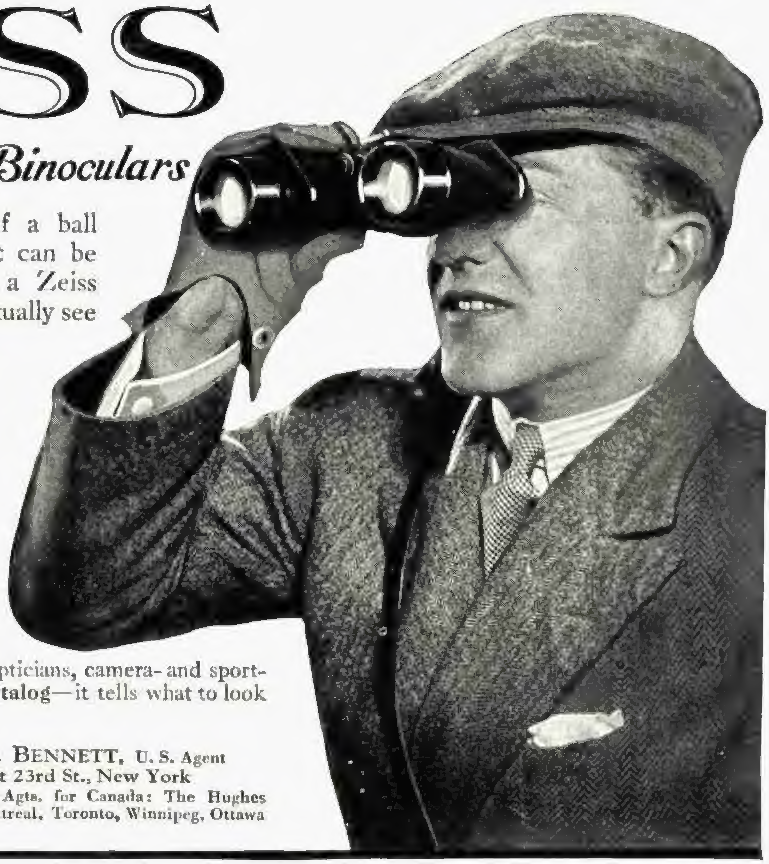

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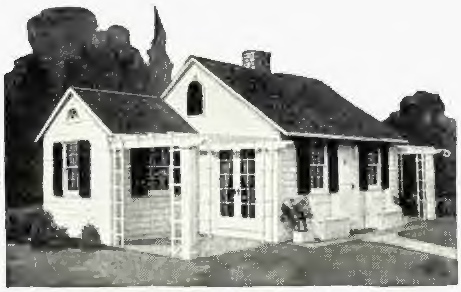

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Prevent this

A condition bad teeth may cause

Bad Teeth May Bring Crippling Rheumatism

Health and Happiness, Authorities Say, Depend on Tooth Care

The importance of preventive dentistry can't be overstated. Perhaps it may seem absurd to attribute rheumatism or melancholia to poor teeth. But science has proved the connection.

If you doubt this, ask your dentist. Let him tell you the serious consequences to which bad teeth may lead. He will tell you that many dread diseases are traced directly to bad teeth; that even life itself may be shortened by teeth that have become diseased.

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A New York newspaper says:

> "The best results are obtained by giving the teeth the right care every day, supplemented frequently by a thorough treatment at the office of a dentist."

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Give yourself a chance!

A hospital in New York maintains this dental clinic to help boys and girls to health and happiness.